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THE EFFECT OF FINNISH AND US HOLIDAYS ON HELSINKI STOCK EXCHANGES

Finance
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ABSTRACT

THE EFFECT OF FINNISH AND US HOLIDAYS ON HELSINKI STOCK EXCHANGES

Study

The purpose of this thesis is to show whether the holidays in Finland or in the USA affect returns in Finnish stock markets. Previous studies of anomalies on different markets are exhibited and methods based on the returns in Finnish markets are investigated by adjusting former models of anomalies onto the new data. Results are compared with earlier studies and differences analyzed. The core of the thesis is the holiday effect, supported by analysis of other anomalies, the weekend effect and the January effect.

The theoretical part is based on several studies about anomalies in finance literature. The empirical part is based on the daily returns in the Helsinki Stock Exchanges from 1991 to 2003. Regression models are used to analyze the existence of significant anomalies. Statistical tests verify the significance level of the observations.

To prove the practical meaning of the phenomenon, an investing strategy based on the holiday effect is presented and employed. Theoretical portfolio including the 25 most traded stocks from the main list returned on average 14 % per year from 1991 to 2003.

Results

A very strong and statistically significant holiday effect is reported on trading days prior to holidays. Weekend effect presented negative returns on the first half of the week and positive returns on the second half on the week. The statistically significant January effect or effects of the US holidays are not found.

Key words

Anomalies, holiday effect, January effect, weekend effect

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1 Introduction

1.1 Background and motivation

Have you ever been thinking about a simple way to invest and make a lot of money without risk? Has your friend ever given you nice tips on how to invest your money without risk and make profit easily? This thesis will guide you on how to notice the holiday phenomenon in your investing strategy and make impressive profit with lower risk…

Calendar anomalies have been an intensively investigated subject for finance theory during the past century. One reason for this interest has surely been the attractive profit opportunity. Recent studies show that certain calendar anomalies still exist after all these years. It is shameful, because markets are said to be effective. This means markets should reflect on all the information of the studies and the investors should start acting to lead the prices towards the equilibrium. This movement should weaken the effect of these anomalies since it is not possible to profit by the phenomenon anymore (Fama, 1965, 1970).

Anomaly is a phenomenon, where returns on markets depart significantly from mean returns around the time of a certain event, such as, for example; holidays. Anomalies are divided into two categories: fundamental anomalies, which are firm specific and seasonalities, which are subject to time periods. This paper presents the theory and results of previous studies discussing the most important fundamental anomalies and seasonalities. However, the empirical part of this paper focuses only on seasonalities.

The purpose of this thesis is to find out whether the holiday effect anomaly is significant on the Helsinki Stock Exchanges. Because the effect can interact with the weekday and the month when the holiday takes place, analyzing the weekend effect and the January effect anomalies is relevant. The January effect and the weekend effect are tested separately to find out whether they are significant on the investigation period and

therefore reasonable to consider in conclusions. Of course, since the weekend effect and the January effect are the most investigated anomalies in the finance literature, it is interesting to investigate whether they are still significant in Finland.

In previous studies the holiday effect is reported presenting significantly higher returns on trading days just prior to holidays than other trading days. Thus, the phenomenon is also called a pre-holiday effect in literature. One explanation is that the effect is due to the reluctance of small investors to buy before holidays, which produces an increase in the average size of bid orders. Institutional investors are interested in this effect, because it has been exploited in some individual stocks (Pardo and Meneu, 2003).

Past studies also present that, on average, January carries higher returns than other months. The commonly used explanation to this phenomenon is the investor's smart tax policy (Haugen & Jorion, 1996). In addition, earlier studies have concluded that returns after the weekend are negative and usually turn to the positive side at the end of the week. Several explanations have been introduced for this phenomenon. One is that the companies tend to release their bad news at the end of the week and the weekend gives investors more time for financial planning. In many exchanges there are negative Mondays, but in Europe there are also negative Tuesdays. The dominating role of the US markets is said to cause this difference (French, 1980).

Large markets in the USA have strong effect on all other markets around the world, especially on small markets like Finland's. Hence, in this thesis the power of the US markets is notified in the conclusions and in the empirical chapter the Finnish and the US holiday effects are tested separately.

After all the theory, the prevailing question is: "Is it also possible to profit by the anomalies in practice"? Markets are said to be effective meaning arbitrage opportunities are not available, but in a way anomalies still provide chances to make profit. In the end of this thesis establishing a trading strategy based on the holiday effect proves the

practical meaning of the holiday effect. Active trading around holidays returned on average 14 % per year in the period from 1991 to 2003.

None of the previous studies are alike, which motivates this thesis. Some papers are discussing anomalies in the Finnish markets, but only one is focused on the holiday effect. However, it presents a slightly different method than will be used now.

This thesis culminates to the practical investing strategy exploiting the holiday phenomenon. Previous papers in the Finnish markets have not provided practical advice for individual investors on how to exploit the holiday effect in daily trading. This alone separates this thesis from others and makes it unique in the wide field of anomaly investigation.

1.2 Research questions

The topic of this thesis expresses several questions. Commonly known anomalies are a widely investigated subject in finance theory, but usually studies have stayed on a theoretical level and focused on one anomaly only. Therefore, the interesting question is how the anomalies are linked to each other and how the information can be utilized in daily trading strategy. Answers to the following questions are found in this thesis:

Question 1: Is the holiday effect significant in the Helsinki Stock Exchanges and does it correlate with both Finnish and US holidays?

Question 2: Are the January effect and the weekend effect still prevailing in the Finnish markets?

Question 3: Does the holiday effect correlate with the January effect and the weekend effect?

Question 4: Do the anomalies in the Helsinki Stock Exchanges differ from the anomalies reported in other stock exchanges by other studies?

Question 5: Is it possible for an individual investor or institutions to profit by the anomalies?

1.3 Limitations of the study

Because the main purpose of this study is to document the existence of the holiday effect, other anomalies are merely referred to, excluding the January effect and the weekend effect, which are potential to correlate with the holiday phenomenon.

Because results are compared with previous studies, same methods are used in this paper than in previous papers. New empirical models or tests neither developed nor adapted onto the data.

Only Finnish market returns are investigated and the sample data period is limited from 1991 onwards, when the HEX All-Share Index was presented the first time on its current format. Returns in the main list and HEX All-Share Index representing them are chosen in analysis and other indices, e.g. portfolio index, only refer to them.

1.4 Structure of the study

The first chapters introduce theory and previous studies. Efficient market theory is gone through and after that a wide literature review presents the different types of anomalies and several studies about the existence of anomalies on different markets.

Following chapters introduce the Helsinki Stock Exchanges market place and the sample data recorded. Average daily returns are then calculated from the data. Empirical methods for testing and statistical tests to prove the significance are introduced.

Then, the empirical methods are adjusted onto the sample data. Results and explanations to them are discussed and criticized. Comparison between previous studies is also done and a change to profit by the anomalies is considered. Trading strategy based on the holiday phenomenon is exhibited and a fictional portfolio's yield on the sample period is calculated.

The summary chapter has a short review through the thesis and what can be learned from it in addition to the motivation for further studies. The structure of the thesis is outlined in Figure 1 below.

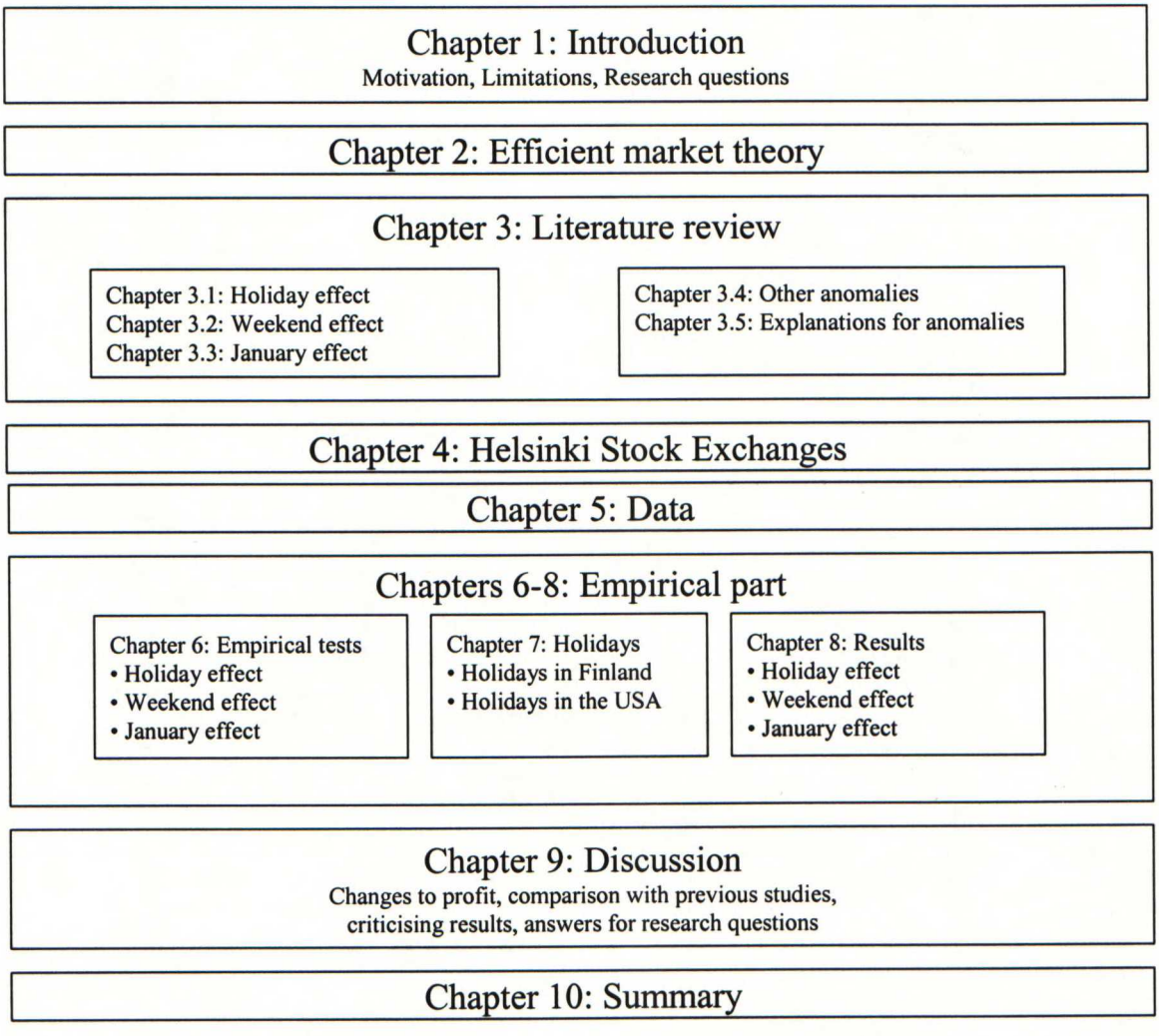

Figure 1 Structure of the study

2 Efficient market theory

Investors require compensation for the postponement of current consumption as they put their money into a stock market. A market in which prices always fully reflect available information is called "efficient" (Fama, 1965, 1970). In an efficient market an investor gets what he pays for and there are no profit opportunities available for professional money managers or smart investors. The market genuinely "knows best", and the prices of securities traded are equal to the values of the dividends these securities pay, also known as fundamental values.

Hence, in an efficient market it is not possible to benefit from constant mispricing of the markets. Market efficiency exhibits the change in the price of any security from one period to another should be random. Furthermore, investors trying to profit from these market frictions will cause movement in prices towards the equilibrium.

However, one can ask whether hypothetical trading based on explicitly specified information set would earn superior returns. Then, information set is needed to specify (Campbell & MacCinlay, 1997).

Under **weak-form efficiency** the information set includes only the history of prices or returns themselves.

Under **semistrong-form efficiency** the information set includes all information known to all market participants, like the market trading volume.

Under **strong-form efficiency** the information set includes all information known to any market participant, including private information.

The assumptions of the efficient market are described by Fama (1970) by the three market conditions here below:

- No transaction costs
- All available information is costless and available to all market participants
- All investors agree on the implications on current information of the current prices and distributions of future prices of each security

In efficient market with the conditions above the price of a stock fully reflects all available information.

3 Literature review

The purpose of this study is to test the holiday effect's statistical significance in the Finnish markets. To gain the most accurate results the effects of other anomalies have to be excluded. However, several studies have shown that the weekend effect and the January effect are strong on the Finnish markets. Therefore they also have to be tested and the results of these tests need to be noted in further discussion.

This chapter introduces these three anomalies, which will be investigated on a more detailed level in addition to a few other commonly known anomalies. The anomalies and explanations presented here are usually observed in all studies dealing with stock returns, thus it is reasonable to assume for them to be prevailing in the Finnish markets.

In addition to these, there are many other not as well-known anomalies and several studies discussing these anomalies are available in literature. Studies provide many different explanations that strongly vary on the market place investigated and are under the influence of data mining biases.

3.1 Holiday effect

The holiday effect is commonly also called a pre-holiday effect, since the effect occurs on trading days just before a holiday. It is not as widely investigated as the most commonly known weekend effect and the January effect, but it is important and interesting, because it provides more attractive potential profit opportunities than other anomalies. This chapter introduces several studies about the holiday effect in different Exchanges.

While abnormal returns by the holiday effect are found abroad, one of the recent studies has also found the phenomenon in the Finnish markets. In his thesis Listola (2004) reported that there is a statistically significant holiday effect for both All Share and Portfolio Index in the Helsinki Exchanges.

In the paper the holiday effect was examined from January 1991 to November 2003. The study examined both the pre-holiday and the post-holiday effects, both with two different event windows. The first window includes only one day prior (or after) the holiday and another window five days prior (or after) the holiday (Listola, 2004).

Results show abnormally high returns one day prior to holidays. The mean return of the pre-holiday days was 32 and 45 times the normal rate of return for the All Share Index and the Portfolio index. Results are statistically significant and independent of other calendar anomalies (Listola, 2004).

The post-holiday effect is not reported to be statistically significant for the All Share Index, but abnormally high returns accruing to Portfolio Index on one day following a holiday are reported. Those returns reported are 45 times the return of ordinary days (Listola, 2004).

Furthermore, returns close to one present just prior to holidays is not only statistically significant but also economically significant. A trading strategy for individual investors to profit from the holiday effect is also recognized in the thesis (Listola, 2004).

On the other markets the holiday effect was found by Ariel (1987) and Lakonishok and Smidt (1988). They show that on average pre-holiday return is large and higher than post-holiday return. Ariel shows that the average return of the day before holiday is eight times of that of other days and post-holiday return is usually negative. Lakonishok and Smidt found exceptionally high returns for each of the two pre-holiday trading days preceding the Christmas and the New Year holidays. Variance of returns is also higher on the day following the holiday but volume drops on the day before the holiday.

Cadsby and Ratner (1992) investigated the holiday effect in several markets. Their data consisted of historical closing prices of eleven stock market indices in ten different countries. Raw data was transformed into daily holding period returns running from 1962 to 1989. To analyze the data, they used dummy variable regression models with several

dummies. Several dummies were needed, because they studied the holiday effect in local markets in each country and the US market's effect on the local markets. Different dummy variables were used for local holidays, US holidays and holidays that are both local and national holidays in addition to a constant for holding period's average return.

They reported higher returns on days before a holiday in US, Canada, Japan, Hong Kong and Australian markets. In their paper the holiday effect was not significant on European markets. All these countries exhibiting holiday effect do so with reference to their own local holidays and the only country exhibiting also a significant US holiday effect was Hong Kong. However, in all countries the highest returns seem to be earned on days just prior to joint local-US holidays.

Returns prior to holidays are outstanding. For example on the US markets Cadsby and Ratner (1992) reported returns of seven and a half times as high as non-holiday returns for the equal-weighted index. For the value-weighted index returns were even higher, exceeding ten times just prior to holidays than on other days of the year.

In later studies the holiday effect is also found in European markets. Pardo and Meneu (2003) investigate the existence of the holiday effect on the most traded blue chips of the Spanish Stock Exchange. The stocks analyzed in their paper are also traded in both the New York Stock Exchange and the Frankfurt Stock Exchange. The data they used consisted of daily prices, trading volumes and spreads for the five most traded stocks from January 1990 through December 2000. They used similar dummy variable regressions to analyze as Cadsby and Ratner (1992) used, but they also added in the model for an extra dummy for Germany's effect. Another regression they used was only for local markets, having only one dummy variable for local holidays, 90 days of 2756 trading days on the period.

High abnormal returns were reported on the trading days prior to holidays. On trading days before holidays, stocks show high mean returns averaging from six to fourteen times the mean returns for the remaining days of the year.

Although the stocks analyzed are also traded in Germany and USA, several tests prove that the Spanish holiday effect is not due to the market calendars in the USA or Germany. They also reported that the pre-holiday effect does not depend on other calendar anomalies, the January effect or the weekend effect – although 24 of 90 holidays were Fridays.

Institutional investors are interested in the results of their study, because this anomaly could have been exploited in some individual stocks in earlier studies. Pardo and Meneu (2003) investigated if investors can take profit from the holiday effect by the five stocks they analyzed in their paper. They used trading costs ranging between 0,13 % and 0,20 % during the analyze period. Therefore, market frictions cannot preclude trading strategies from exploiting the holiday effect.

An interesting result was that the holiday effect compensates market frictions in some other stocks. These results have practical applications for Brokering Companies. They can exploit the holiday effect by establishing strategies based on the purchases of stocks before the closing on the day prior to a holiday and then canceling them at the last moment on the following day. In addition, small investors can also benefit from this effect as sellers. They can obtain better prices if they decide to trade at the end of days prior to a holiday. After all, the holiday effect indicates that the worst day to buy is the day before a holiday.

Redman et al. (1997) examined the existence of four calendar anomalies for REITs (Real Estate Trusts) and common stocks. They used data from CSRP to construct a daily, equally weighted portfolio of REIT shares over the time period from 1986 through to 1993. In addition, the daily value and equal-weighted returns indices of NYSE and AMEX stocks were analyzed over the same period. The value-weighted index is a proxy for large companies while the equal-weighted index is a proxy for small companies. It was of interest to investors (both individual and institutional) to determine whether REIT shares exhibit seasonal patterns similar to that of common stocks.

They used similar dummy variable regressions for analysis as used in all the studies presented above. However, they had only one dummy variable for the pre-holiday trading day. All the other possible factors were left without any considerations.

The empirical results provide evidence of the existence of all of the calendar anomalies for the REIT portfolio and the equally weighted portfolio. In the regression, the pre-holiday dummy variable is positive and significant for REITs and equally-weighted index. This means that pre-holiday returns are significantly higher than the non-pre-holiday returns.

Still, although investors can earn higher returns trading on pre-holiday trading days, investors in REIT shares and small company shares earned a substantially higher average daily return compared to that earned by investors in large company shares.

In their study Lucey and Pardo (2003) address the concerns in several papers, criticising the ability of investors to implement seasonal strategies implied by academic papers. The purpose of their paper is to extend the conventional academic approach to testing for stock market seasonality in order to provide investors a useful tool that allows them to implement the strategies implied by the academic papers.

First they checked that pre-holiday return compensates market frictions. After that they tested the existence and the changing nature of such anomaly. Finally they considered the profitability of the pre-holiday trading strategy in an out-of-sample period.

The conventional academic model for testing for stock market anomalies, which Lucey and Pardo (2003) discuss, is consisted of four steps:

1. Building an economic model and listing the hypothesis or hypotheses of interest
2. Specifying the statistical model to test the hypothesis
3. Estimating the parameters
4. Validating the model

They present several reasons why the most commonly used model, the dummy variable regression model, should be criticized; for example, F-test tendency to reject the null hypothesis, serial correlation and heteroskedasticity.

In the tests they use two sets of data to assess the strategy; Spanish and Irish. Both are incorporating individual stock level data and index data. In both cases they examine the existence and stability of the pre-holiday anomaly prior to 2001. A trading rule is then implemented and assessed over the January 2001 – December 2002 period.

Results show that pre-holiday results are significantly higher than the average return for the rest of the days. On average it is five to fourteen times the mean returns for the remaining days of the year. The pre-holiday return is very significant for both countries, Ireland and Spain, and for both the share and the index level returns.

In the tests the hypothesis of equality of variances cannot be rejected but the equality between the pre-holiday mean return and the non-holiday mean return is rejected.

After documenting the persistence or increase of the holiday effect they further investigate whether a pre-holiday trading strategy can be profitable in an out-of-sample period. In this sense, the pre-holiday trading strategy consists of buying at the end on the day prior to each pre-holiday and selling at the end on each pre-holiday.

It is informative to compare the pre-holiday trading strategy with the buy-and-hold strategy of the new sample. Their analysis shows that the returns on the day prior to a holiday are larger than the total transaction costs (spread and round-trip costs). They show that the total outcome from buy-and hold strategy is negative in all cases. However, the pre-holiday trading strategy offers a clearly different result. It was seen that, although the market trend was clearly negative, the implementability of a pre-holiday strategy would have turned out to be profitable.

After that the question was whether the pre-holiday profit clearly differs from the profit available on a set of randomly selected days? In order to answer to this question, Lucey and Pardo (2003) used a benchmark to evaluate whether the pre-holiday trading profits were significantly different from profits earned at other times. To test it, 10000 sets of generated data were simulated. Each set of data represents the result from trading on over 15 (Spanish) / 12 (Irish) randomly selected trading days, both pre-holidays and non pre-holidays, and the profits/losses from the generated series become the benchmark.

It was shown that the profit from the pre-holiday trading strategy is always around the upper percentiles and, consequently, this strategy can be considered significantly different to that which could be earned from other random combination.

After all, it was shown by using the repeated sampling that it is possible to earn more from trading on pre-holidays than it could be earned by chance.

Bildik (2004) investigated all types of anomalies on one of the leading emerging markets – Istanbul Stock Exchanges. The purpose of the paper was to detect whether calendar anomalies are still alive or not even, though these anomalies have been documented long ago. One of the subjects in the survey was the holiday effect.

The data they used consisted of daily closing values of the ISE-100 index from January 1988 to January 1999. Daily return is calculated as the percentage logarithmic change in the value of index is compared to the previous day's closing value. In order to test whether the seasonalities in stock returns and trading volume, the same method that was used in previous studies was applied: the regression model with dummy variables.

To reject hypotheses, F-test applied with dummy-variables, the non-parametric Kruskal-Wallis test for testing the equality of changes and the Levene test for testing the equality of variance of changes were used to since the stock returns were not normally distributed. Non-parametric tests provided additional information regarding robustness of the statistical results held by t-tests where the data does not fit in the normal distribution.

Findings indicate that holidays have a significant impact on the return and volume behaviour of stocks. Average pre-holiday return is significantly higher than post-holiday by twofold to sevenfold depending on the period analyzed. The average pre-holiday returns were 0,63 % whereas post-holiday return was 0,13 % when the pre- and post-holiday returns were defined as two days prior and after a holiday. A strategy such as buying before a holiday and selling after a holiday was profitable even after transaction costs.

In addition to return behaviour, the volume and variability of stock returns around holidays were also examined. The volume of the first day following a holiday is the lowest in period. Volume declines also in the last day due to the concerns of investors for the closure of the market during the holiday period, where unexpected information might be released. Investors who want to avoid taking this risk prefer selling stocks before the holiday. Moreover, volatility of returns on the first day following a holiday reached its peak level in the holiday period.

Findings indicate that holidays have an impact on the return and volume of stocks. Bildik (2004) examined also the presence of other calendar anomalies that have been documented worldwide. The evidence in the study indicated that almost all of types of calendar anomalies exist in stock returns and trading activity in the Turkish Stock Market.

The research reported low and negative returns over the first part of the week (Monday through Tuesday) and large positive returns over the second part of the week (Wednesday through Friday). This is a typical manifestation of the weekend effect.

The paper also indicates that average daily returns in January are four times of that non-January months. This is a clear manifestation of the January effect.

Next chapters will widely present these important anomalies. In addition to them, several other important anomalies are referred to shortly.

Explanations

One of the explanations for the holiday effect is called a study of different liquidity measures. It suggests that the pre-holiday effect could be due to the reluctance of small investors to buy on pre-holidays, which produces an increase in the average size of bid orders. Pardo and Meneu (2003).

Ariel (1990) suggests that short-sellers cause the holiday effect when deciding to close short but not long positions in advance before holidays, simply because of some clients who prefer buying (or avoid selling) on days prior to a holiday.

The negative returns in August and September could be explained by the holiday phenomenon, which implies that returns tend to be high before the holiday season and low after it (Cadsby & Ratner, 1992).

French (1980) presented an explanation that investors might be reluctant to trade before a holiday where they are subject to unexpected news and information releases.

3.2 Weekend effect

This anomaly has two commonly used names, the weekend effect and the day-of-the-week effect. The clue in this effect is that prices tend to be higher on Fridays than on Mondays. So, what happens during the weekend?

Much interest has been aroused by the revelation of the weekend effect in US stock returns. However, Condoyanni, O'Hanlon and Ward (1988) found that weekend effects are the norm rather than being US-specific. In their study they inspected the New York, Sydney, Toronto, London, Tokyo, Paris and Singapore Stock Exchanges. Indices were collated from a daily data basis on all weekdays (Monday to Friday). The investigation period lasted from 1.1.1969 to 31.12.1984. Following the methodology that several researchers have used to investigate the phenomenon in the US market, they regressed the returns of each stock market on five dummy variables representing Monday through

Friday for the full sixteen-year period. For all markets except Australia they repeated the test for four subperiods of four years each.

According to the F-statistics there is a strong and general weekend effect (the 5 percent level is used). Also, significant negative parameters estimates for Monday are observed in the Canadian and UK markets. However, the results of the UK markets are not very close to US ones. This is probably subject to the UK markets' different way to make transactions in two-week periods. In the French markets the negative Tuesday was more significant than the negative Monday. In the period as a whole, the weekend return is negative but not significantly so, while the Tuesday returns are strongly negative. In the case of Japanese, Singapore and Australian markets, both Mondays and Tuesdays exhibit negative returns.

The study expressed following conclusions:

The type of correlations is strongly related to the different time zones in which markets are located. Far Eastern markets tend to be more strongly correlated with the behavior of non-Far Eastern markets of previous days than with the behavior of those non-Far Eastern markets on the same day.

All indices have significant serial correlation. In most cases the coefficients are consistent with a weak and auto-regressive of order one, but France, Japan and Singapore exhibit more complex processes suggesting moving average or higher-order auto-regressive processes.

The US market has the dominating role. Both Far Eastern markets are significantly correlated with the US markets with the previous two days, Singapore also being lesser correlated of the same day. Canada and the UK are both correlated with the US of previous day. France is the only country that is not significantly affected by US returns over at least two days. On the other hand, the returns on the US market are not lag correlated with the previous day's returns of any market other than itself.

Negative Mondays appear not to be a global phenomenon. Kauppi and Martikainen (1994) state that negative Tuesdays have been discovered in many small European markets. Correspondingly, Lee, Pettit and Swankoski (1990) found that day-of -the -week patterns exist in a sample of major Asian stock markets the Tuesday returns being most negative in Japan, Korea, Singapore, and the negative Monday returns being of lower magnitude than experienced in the US.

To explain the weekend effect Foster and Viswanathan (1990) present a theoretical model with three factors, a single informed trader, a competitive market maker and a group of liquidity traders. They assumed that private information is released throughout the week, but public information is received only on weekdays. The model of Foster and Viswanathan predicts that stock return variances are the highest on Mondays and decreasing towards Fridays. Hence, on Mondays the informed trader has the maximum information advantage.

French (1980) points out that the companies tend to release their bad news at the end of the week. This is because they want to give investors time to adapt to the new information. When investors try to make up their mind this prevents huge variations in stock markets. However, according to French, this can not be the only reason for negative Mondays because investors would incorporate their expectations of bad news to stock markets during the whole week.

According to Miller (1988) at the beginning of the week self-initiated sell orders beat the self-initiated buy orders (self-initiated orders are orders investors have made during the weekend based on public information). There are two explanations to this effect. The first is that investors have more time during the weekends to do their financial planning and there is more information available after weekends than after a weekday. The second explanation is broker-related. To give purchase recommendations brokers do not have to search for individuals who own the stock. According to the short selling restrictions a stock can only be sold, if the investor already owns it. In addition, brokers receive

commissions if stocks are bought following their recommendations. This motivates brokers to pass buy recommendations to the markets.

After the weekend negative Mondays and negative Tuesdays are observed. Mainly, the negative Tuesdays are observed in European markets. This effect is explained by the power of the US markets. Negative returns in the US markets on Monday reflect the decline to European markets on Tuesday. Another explanation for negative Tuesdays are the trading systems. In practice many selling orders placed on Monday come true on Tuesday.

The weekend effect has also been recently found in the Finnish markets. Wikström (2002) analyzed stocks' returns from 1970 to 2001 on the Helsinki Stock Exchanges. Similar regression models, which are used in almost all of the previous studies, displayed statistically significant weekend effect.

The paper reported significantly negative returns on Wednesdays and significantly positive returns on Fridays. The difference in the model was that the analysis was pursued by comparing Monday, Wednesday and Friday returns to the base returns formed Tuesday and Thursday.

3.3 January effect

The January effect is the second commonly known anomaly in addition to the weekend effect. The stock prices are on average higher in January compared to the other months. The January effect was at first introduced to the academic literature more than 60 years ago by Wachtel for the US stock market (Haugen & Jorion, 1996). However, its reintroduction in 1976 had a greater impact than the initial article because it was the first evidence taken seriously that brought into question the then-accepted paradigm that security markets are informationally efficient, reflecting in an unbiased manner all available information that is relevant to pricing.

According to the theory of market efficiency the January effect should have been priced away promptly after its discovery, because investors should begin exploit this profit opportunity. So, prices would start rising causing the profit opportunity to disappear. However, this market reaction has not realized and therefore the researches have concluded there has to be strong reasons for investors not to benefit from this market friction.

In their study Haugen and Jorion (1996) examined the monthly returns on New York Stock Exchange firms from 1926 to 1993 and documented the existence of the January effect throughout the period. At the beginning of each year they ranked these stocks on the basis of total market capitalization. The stocks were then formed into equally weighted deciles, and within each deciles, time-series regressions were run over the full period. The regression models consist of a constant term for monthly return except January and a dummy variable for the January return.

The January returns are significantly larger than for other months for all but the largest deciles. Furthermore, the difference decreases from 12,4 percent for the smallest to 0,5 for the largest decile.

Based on the evidence they presented, however, the January effect is not disappearing. More important, there has been no significant reduction in the magnitude of the effect since its rediscovery in 1976. This finding has two possible explanations:

- The January effect does not mean market inefficiency, because it provides no opportunity for investors to earn abnormal rates of return. The main reasons for this are the transaction costs.

- The financial market is highly inefficient. When confronted with opportunities to make abnormal returns, insufficient numbers of investors – because of agency problems, risk aversion, inertia, or other obstacles – act so as to eliminate these opportunities over reasonable periods of time, decades.

As in the study presented above, Keim (1983) presented that the January effect is usually much stronger for small stocks and thus, it should be investigated with size effect. Thus, small stocks deliver higher returns on average than large stocks and in addition small stocks usually deliver higher volatility than large stocks. As a result of this it is more likely that small stocks provide large negative returns and are probable to sell. This is because to minimize taxes to pay on capital gains, investors usually sell not only those stocks that have performed very well, but also stocks carrying negative returns since bought, because in most of the countries it is possible to derogate capital losses from taxable income. The sale of these stocks performing worse is usually scheduled just before the end of tax year. This is commonly known as a tax-loss-selling hypothesis.

There are also other assumptions to explain the driver of the January effect. The multitude of explanations for the January effect leaves the reader confused about its primary cause(s): is it tax-loss selling, window-dressing, information, bid-ask bounce, or a combination of these causes? The confusion arises, in part, because evidence has been presented in support of a particular hypothesis though the same evidence may be consistent with more than one hypothesis (Chen & Singal, 2001).

The influence of the anomaly drivers in the US markets were investigated by Chen and Singal (2001). They concluded that past losers are more likely to be sold in December than in January to realize the tax advantage of capital losses. On the other hand past winners are more likely to be sold in January than in December to postpone the payment of taxes. The selling depends on changes in volume around the turn of the year according to the tax-related selling hypotheses. When they used the midpoint of quotes instead of actual prices the results are not significantly affected: the bid-ask bounce accounts for about 20-25% of the observed returns.

In addition they examined stock returns around June-July to verify the window-dressing hypothesis. This is the period of semi-annual reporting by institutional managers that is not contaminated by tax-related trading. Chen and Singal (2001) did not find an

economically meaningful difference between the 5-day return at the end of June and the 5-day return at the beginning of July. Hence, this is not consistent with window dressing.

If the January effect occurs due to release of new information in January that affects the companies that possess less information more than the companies that possess more information, then the returns in January should be related to the availability of information (for example, with the number of analysts as a proxy). Chen and Singal (2001) did not find a correlation consistent with the information hypothesis. There is no information-related effect in June-July.

After all, the evidence here supports the tax-related selling hypotheses as the drivers of the January effect.

The January effect is recently found also in the Finnish markets. Wikström (2002) reported that the January effect has been evident in the sample period, from 1970 to 2001. But, when the effect was tested on a shorter period, from 1980 to 2001, the signification disappeared. This implies the need for large sample, because the event was explained by data mining biases.

3.4 Other anomalies

The major stock market anomalies observed are classified into two groups (Kauppi & Martikainen, 1994). The first group is called fundamental anomalies. They are referred to regularities due to firm specific variables, such as firm size, E/P ratio and share price. The second group is called seasonalities. It includes anomalies related to the month of the year, day of the month and day of the week, among others. The January effect and the weekend effect presented above are the most commonly known seasonalities in addition to the holiday effect. This chapter introduces some less well-known seasonalities and fundamental anomalies.

Firm size

The first time the firm size effect was discovered was by Banz. He presented that when other things are equal the smaller the market value of equity, the larger the expected rate of return on a stock (Banz in 1978). No adequate answer has yet been provided for this long run negative effect of firm size on risk adjusted stock returns. One outstanding explanation is that the hypothesis of market betas is not properly estimated. This is an interesting and widely accepted reason for the anomaly (Kauppi & Martikainen, 1994).

E/P and other earnings figures

The E/P anomaly was at first found by Basu. He reported that a distinct positive relation between E/P ratios and average returns in excess of those predicted by the CAPM could be found on US markets (Basu, 1977). There are also many other earnings related anomalies. One known is the so-called post announcement drift. It means drift in stock price after company-related news announced. Based on earnings anomalies, Ou & Penman (1989) and Bernand and Thomas (1989) suggest implementable trading strategies that have gained profits in the US.

Day of the month

Ariel (1987) noticed that the returns of US stocks were larger in the turn of the month than in the rest of the month. In addition he discovered that the turn of the month effect seems to hold both for US stock and stock index futures markets. This phenomenon is explained by the fact that US economy has substantial payments to private investors of salaries and debt interest on the last trading day of the month (Ogden, 1990). Another explanation is tactics to release news. Bad news such as that relating to earnings announcements are delayed and announced later in the month, while good news are released promptly at the beginning of the month (Penman 1987). Day of the month anomaly, or turn of the month by another name, is also found in the Finnish markets by Wikström (2002). The study expressed statistically significant abnormal returns in event windows during the days in turn of the month.

Time of the day

Changes in prices during the trading day are observed to vary on time. It is a commonly known phenomenon that stocks tend to go up at the beginning (first 45 minutes) and end (last 15 minutes) of the trading days. This effect is clearly dependent of different time zones in the world. For example, in the afternoon changes in European markets are subject to opening of US dominating markets.

Sunny weather

Psychological evidence and casual intuition predict that sunny weather is associated with an upbeat mode. In their paper, Hirshleifer and Shumway (2001) examined the relation between morning sunshine at a country's leading stock exchange and market index returns that day at 26 stock exchanges internationally from 1980 to 1997. In order to ensure that the effects they identified do not derive from well-known seasonal stock return effects, they examined also the deviation between the day's cloudiness and the ordinary expected degree of cloudiness for that day of the year. One of the 26 stock exchanges in the study was Helsinki Stock Exchanges.

The paper reported that sunshine is significantly correlated with daily stock returns. However, other weather conditions such as rain and snow are unrelated to returns. While the weather does not provide a riskfree arbitrage opportunity, it is possible to improve Sharpe ratio of the market portfolio, though somewhat modestly, by trading on the weather, even when there are transaction costs. These results are difficult to reconcile with fully rational price-setting.

The findings suggest that those investors who can trade a stock index with small transaction costs (most investors) could have benefited somewhat modestly from weather-based trading strategies. However, they think the main practical implication of their findings is somewhat less direct. Their results suggest that investors can benefit from becoming "aware of their moods", in order to avoid mood-based errors in their judgements and trades.

3.5 Summary of explanations for anomalies

Several explanations are presented for anomalies. Usually reasons can be divided into two categories; local and common factors. Jacobs et. al. (2000) presented the following common reasons for anomalies not dependent of the location of the market place. French (1980) and Ariel (1980) completed the list with some explanations to the holiday phenomenon.

Holiday effect

- Short of covering because of happy euphoria
- Investors are subject to unexpected news during the holiday
- Short sellers decide to close short but not long positions in advance of holidays

January effect

- Tax-loss selling
- Window dressing
- Bonuses invested

Weekend effect

- Only a few rationales and most are easily refuted
- Cover shorts on Friday so one can have "peace of mind" over the weekend
- Investors "throw in the towel" after a weekend of reflection
- Bad news is announced after the close of the market on Friday

Turn-of-the-month effect

- Monthly rebalancing; investors may reinvest dividends at this time
- Higher month-end cash flows, such as salaries
- Timing of EPS announcements – tend to announce good earnings earlier than bad earnings

Time-of-day effect

- Closing prices are special – used for performance evaluation
- Opening prices are determined by market call, unlike continuous trading for the rest of the day
- There is a rush to beat the close to buy (after watching the market all day)

3.6 Summary of studies investigating anomalies on Finnish markets

During the few recent years only two previous studies have focused on anomalies on the Finnish markets like introduced in previous chapters. One of them was Listola (2004) who focused on the holiday effect. He reported both pre-holiday and past-holiday effects in the Finnish markets. On average the pre-holiday effect reflected daily returns 32 times the normal daily returns for the HEX All Share Index. Returns were even more for the HEX Portfolio Index. Listola (2004) reported also past-holiday effect, abnormally higher returns one day after the holiday and then negative for the Portfolio Index but not statistically significant for the All Share Index.

The other paper, Wikström (2002), investigated the January effect, the weekend effect and the turn of the month effect on the Finnish markets and statistically significant evidence was reported. The January effect indicates higher returns on January. The weekend effect was found reflecting negative returns on Wednesdays and positive returns on Fridays.

4 Helsinki Stock Exchanges

During the past decade there have been interesting changes in the Helsinki Stock Exchanges (HEX). The markets has been alternately bullish and bearish, there has been recession at the beginning of the 90's and upswing at end of 90's, which is commonly known as the IT-boom. The information technology boom caused several IPOs and brought new IT-companies into the HEX. See the figure 2 to image the serious changes in the markets.

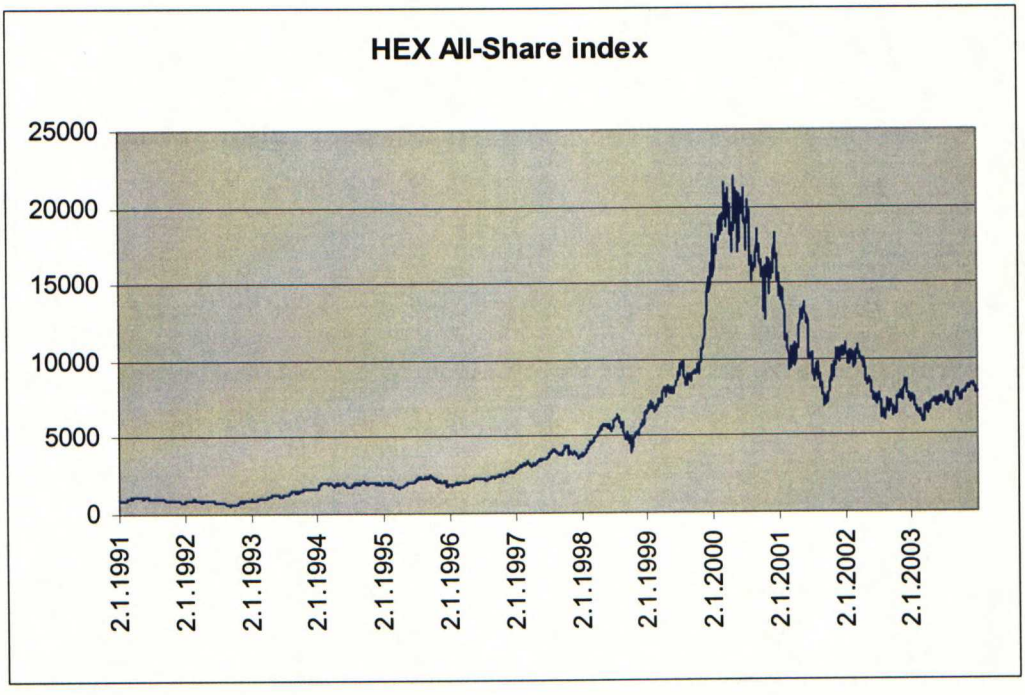

Figure 2 Market development in the Helsinki Stock Exchanges from 1991 to 2003

The big changes in the markets at the end of the investigation period have caused huge variances in returns. The standard deviation at and of the period is almost doubled since the first period (see Table 1.). These changes have also notable influence to empirical tests present later on this paper.

Table 1 Changes in return variance during the investigation period

Period	Variance	Standard deviation	Standard deviation %
1991-1997	0,00016	0,01252	1,25 %
1998-2003	0,00068	0,02600	2,60 %

On the Finnish markets the HEX indices family includes All-Share, Portfolio, I List, NM List, HEX 20, Industry specific indices and Share specific indices. Both the All-Share index and the Portfolio index reflect changes in prices and total-returns development on the main list. In the Portfolio index the maximum weight per one company is limited up to 10 % but in the All-Share index there are no limitations. Non weight-limited indices are calculated during continuous trading and after each transaction constituting at least a round lot. Weight-limited indices are calculated at a ten-minute interval during continuous trading (HEX (a), 2003).

Hence, in the HEX all share index, where companies are included in the index based on their actual market values, it leads to a dominating role of the biggest companies (see weights in Figure 3). Nokia Oyj has the biggest market value, more than 40 % of the total market value of HEX. In addition, 10 biggest companies listed in the Helsinki Exchanges dominate the marketplace by 75 % of the total market value. In the Portfolio index the three biggest, Nokia Oyj, Stora Enso Oyj and UPM-Kymmene Oyj each have the maximum weight of 10 % (HEX (b), 2003).

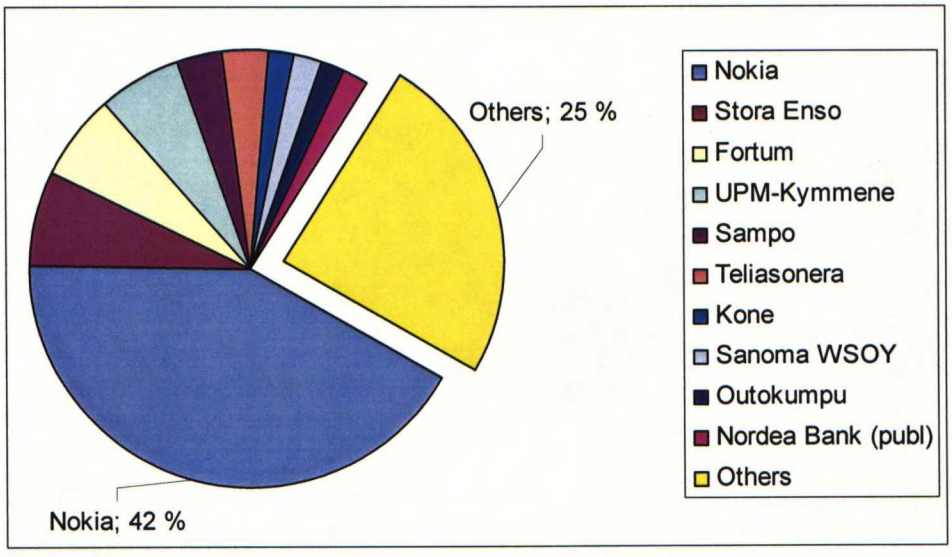

Figure 3 Companies' weights in the HEX All-Share index (HEX b 2003)

The market value of the HEX is quite small compared with other stock exchanges. For example, the market value of the HEX is only 1% of the market value of the New York Stock Exchange (NYSE). However, the HEX has been growing continuously during the 90's, mainly because of the Nokia Oyj and the IT-boom.

It is important to notice that big companies dominating the HEX are also listed in the US markets. It means changes in the big US markets reflect changes straight to Finnish markets. In the analyses done in this thesis, movements in the US markets are included and noticed to support further limitations and discussion.

In this study, stock markets are analyzed using the HEX All-Share index. The portfolio index is not used, because in previous studies only the general index is referred to and results of this study have to be comparable with previous papers.

Later in this study changes to profit by the anomaly phenomenon are investigated. The investigation is based on a HEX25 Index, which is based on the 25 most traded stocks on the Helsinki Exchanges. The index will be introduced more thoroughly in chapter nine.

5 Data

The data used in this study consists of daily returns on the main list of the Helsinki Stock Exchanges from 1991 to 2003. The daily returns are calculated from HEX All Share Index by using logarithmic (continuously compounded) returns. Values used are daily closing values. Daily closing values are the same than beginning values of the next day.

$$return = \ln \frac{P_{t+1}}{P_t} \tag{5.1}$$

Where P_{t+1} = price (or index) next day in the morning

P_t = price (or index) today in the morning

The returns are adjusted for cash dividends and stock splits. Dividends are a very important source of shareholders income, hence it is very important to incorporate dividends in the analyses. There are also companies that have merged during the investigation period. In these cases the study has included them by weighting their daily returns by the number of shares listed at the time of the merger.

The total amount of trading days is 3251 from January 1991 to December 2003. There are 92 pre-holiday trading days recognized during this time period.

In the end of the thesis adjusting models to the returns of HEX25 Index Share Fund test practical trading strategy. The HEX25 Index Share Fund is an exchange-traded fund. The fund's shares can be bought and sold on the Helsinki Stock Exchange like normal equities. The values of this index reflect the values of the HEX All Share Index pretty well.

6 Empirical tests

As stated in the introduction, the second half of this study is devoted to investigating whether there are still anomalies in Helsinki Stock Exchanges. Methods used in this chapter are based on literature and previous studies introduced in previous chapters.

The focus is to find out whether the three commonly known anomalies, the January effect, the weekend effect and the pre-holiday effect exist in the Finnish markets. The January effect and the weekend effect are tested separately to find out whether they are significant and thus, whether it is reasonable to consider if there is a possibility that they can interact with the holiday effect. In addition, the power of the US markets is taken into calculations.

6.1 Hypotheses

The study hypotheses are mainly based on results found in the previous studies during the past decades. Naturally literature of anomalies and traditional market theory are also considered to sharpen the focus.

Hypothesis 1: There are significant (significance level of 95 %) anomalies in the Helsinki Stock Exchanges. Commonly known anomalies are found in all big markets and also in Finnish markets in past studies. Anomalies have not disappeared, thus they are still a significant factor for trading.

Hypothesis 2: The holiday effect is significant on the trading days just prior to holiday. In other studies the holiday effect has been strong in almost every market, so it is assumed to be effective significant in Finnish markets also. But Finnish and US holidays are assumed to affect the returns.

Hypothesis 3: Interactions between the holiday effect and the other anomalies are assumed, so other anomalies affect the holiday effect. This interaction is reflected as

higher returns on pre-holidays in January and Fridays than on other pre-holiday days. Because commonly known anomalies carry a strong effect on returns, they must affect the pre-holiday effect also if they occur on the same day.

Hypothesis 4: Weekend effect causes negative returns on Mondays and Tuesdays. Most of past papers have reported negative returns on Mondays and Tuesdays in European markets and some also in the Finnish market.

Hypothesis 5: January effect generates on average higher returns in January. This phenomenon is found in previous studies and the assumption is that the effect has not disappeared. Because of the investors' smart tax policy there is not a motive for diluting.

Hypothesis 6: It is not possible to profit by the anomalies. According to the efficient market theory all information available is reflected in stock prices. Thus, there are not arbitrage opportunities in the Finnish markets.

It is important to notice, that later some hypotheses are reversed. This is done only because of mathematic operations needed for statistical tests. The results are nevertheless the same. They are also compared with hypotheses in later discussion and answers to questions are also reported in the same chapter.

6.2 Holiday effect

The method to test the holiday effect is a regression model. The model is similar than Meneu and Pardo (2003) used to analyze holiday effect on Spanish markets. However, now the impact of other countries is rejected and only the impacts of January effect and weekend effect are included.

Basic form of regression model is:

$$r_t = \alpha_0 + \alpha_1 D_{1t} + e_t \qquad (6.1)$$

r_t = daily rate of return in day t

D_{1t} = is dummy variable, 1 on day prior to holiday and 0 otherwise

e_t = unexplained component in day t (= error term)

The advanced regression model used in this thesis is modified from the two models Meneu and Pardo (2003) used. They had one regression considering January effect and one considering weekend effect. Here, these are combined and the form has same model than the form Meneu and Pardo (2003) and Cadsby & Ratner (1992) used to analyse US effect parallel to local holiday effect. So, dummies are placed for normal holiday, holiday that is on Friday, holiday that is in January and holiday that is Friday in January.

The combined regression model is:

$$r_t = \alpha_0 + \alpha_1 D_{h-f-j} + \alpha_2 D_{h+f-j} + \alpha_3 D_{h-f+j} + \alpha_4 D_{h+f+j} + e_t \qquad (6.2)$$

r_t = daily rate of return in day t

D_{h-f-j} = is dummy variable, having value of 1 if the day is prior to holiday but not Friday or in January.

D_{h+f-j} = is dummy variable, having value of 1 if the day is prior to holiday and Friday but not in January.

D_{h-f+j} = is dummy variable, having value of 1 if the day is prior to holiday in January but not Friday.

D_{h+f+j} = is dummy variable, having value of 1 if the day is prior to holiday, Friday and in January

e_t = unexplained component in day t (= error term)

Table 2 below will clarify the difference of the different dummy variables. The "plus" sign in the table means that the type of the day turns the dummy's value to one if the pre-

holiday day is a certain type. The "minus" sign means that certain type does not effect the value of the dummy variable.

	Pre-holiday	Friday	January
$D_{h\text{-}f\text{-}j}$	+	-	-
$D_{h+f\text{-}j}$	+	+	-
$D_{h\text{-}f+j}$	+	-	+
D_{h+f+j}	+	+	+

Table 2 Types of pre-holidays effecting on different dummy variables

The F-test is used to test the significance level of how the whole regression model fits on the data. According to the null-hypothesis there is not a significant difference in day t return. If the F-value exceeds its critical value the null-hypothesis will be rejected. This means that returns on that day are statistically different than returns in the other days. Furthermore, it means that there is a holiday effect according to the chosen 95 % confidence level.

The t-test is used to analyze a single coefficient. Though the whole model is valid, all the single coefficients do not have to be. Exceeding the critical t-value means the null-hypothesis will be rejected. Note, that the t-test here is a one-tailed one because hypothesis is that return prior to holiday is higher than that of other days'.

$$H_0 : \alpha_1 = 0$$
$$H_1 : \alpha_1 > 0 \qquad (6.3)$$

Critical p-value = 5 %
Critical F-value = 3,84
Critical t-value = 1,645

The important thing here is, that if the weekend effect regression finds some new aspects, for example significant negative Wednesdays (as in hypotheses), the regression model is modified adding one more dummy in it according to this new fact.

6.3 January Effect

The method to test the January effect is also a regression model. The essential goal is to investigate whether the returns in January are higher than in the other months. The same model is used to analyze the January effect in US stock markets (Haugen & Jorion, 1996). In the function there is one dummy variable for January returns. The dummy variable is taking a value of 1 when it is January and 0 otherwise.

$$r_t = \alpha_0 + \alpha_1 J_t + e_t \tag{6.4}$$

r_t = monthly rate of return in month t

J_t = dummy variable, value 1 or 0

e_t = unexplained component in month t (= error term)

The F-test is used to test the significance level. The null-hypothesis implies that there is not a January effect. If the F-value exceeds its critical value the null-hypothesis will be rejected. It means that returns on January are higher than other months thus there is a January effect. The confidence level chosen is 95 %.

The t-test is used to analyze a single coefficient. Though the whole model is valid the January coefficient does not have to be. Exceeding the critical t-value means the null-hypothesis will be rejected. The t-test is a one-tailed test because it is assumed that the January returns are higher than the others.

$$H_0 : \alpha_1 = 0$$
$$H_1 : \alpha_1 > 0 \tag{6.5}$$

Critical p-value = 5 %
Critical F-value = 3,84
Critical t-value = 1,645

6.4 Weekend Effect

The method to test the Weekend Effect is also a regression model with multiple dummies. The essential goal is to analyze the daily returns and test if one of them is statistically different. Martikainen and Puttonen (1996) have used a multiple dummies model to analyze returns in the Helsinki Stock Exchanges. In their model, there are five dummies, one per day. The model used in this study is modified from their model having three dummies: the first for Monday, the second for Tuesday and the third for Wednesday.

The underlying idea is to construct a test for negative returns after the weekend because several studies have found negative returns in Mondays, Tuesdays or Wednesdays. In addition another regression is constructed to investigate the positive returns on the second half of the week and therefore includes dummies for Thursday and Friday. The third model later combines both of these, having dummies for all days of the week.

$$r_t = \alpha_0 + \alpha_1 D_{1t} + \alpha_2 D_{2t} + \alpha_3 D_{3t} + e_t \qquad (6.6)$$

r_t = daily rate of return in day t

D_{1t} = is dummy variable, 1 on Monday and 0 otherwise

D_{2t} = is dummy variable, 1 on Tuesday and 0 otherwise

D_{3t} = is dummy variable, 1 on Wednesday and 0 otherwise

e_t = unexplained component in day t (= error term)

The F-test is used again to test the significance level. The null-hypothesis implies that there is not a significant difference in day t return. If the F-value exceeds its critical value the null-hypothesis will be rejected. This means that returns on that day are statistically different than in the other days. Furthermore, it means that there is a weekend effect. The confidence level chosen is 95 %.

The t-test is used to analyze a single coefficient. Though the whole model is valid all the coefficients do not have to be. Exceeding the critical t-value means the null-hypothesis will be rejected. Note, that the t-test here is a two-tailed test because returns can be positive or negative whereas the previous test (January effect) was a one-tailed test.

$$H_0 : \alpha_i = 0$$
$$H_1 : \alpha_i \neq 0 \qquad (6.7)$$

Critical p-value = 5 %

Critical F-value = 2,60

Critical t-value = 1,96

7 Holidays

7.1 Bank holidays in Finland

There are nine different holidays when the Helsinki Stock Exchanges is closed in addition to weekends as listed below. Two of the holidays are longer than one day: Midsummer is two days and Christmas is three days, two days for the Christmas itself and one day for the Boxing Day. If the holiday is a certain day in the year the date is marked, otherwise the date changes according to year, but is in the same month yearly. (Bank holidays, 2004)

January 1st	New Year's Day
January 6th	Epiphany (Loppiainen)
April	Good Friday (Pitkäperjantai)
May 1st	May Day (Vapunpäivä)
May	Ascension
June	Midsummer
December 6th	Independence Day
December 24th - 26th	Christmas

On the period from 1991 to 2003 there are 92 pre-holiday days which are identified in the sample data. They are bank holidays observed in the middle of the week keeping doors closed one or more days in the Helsinki Stock Exchanges.

7.2 Bank holidays in the USA

There are nine different holidays in the New York Stock Exchanges (later referred to as NYSE). The difference between the Finnish markets and the US markets is, that in the USA doors are open some hours on some of the holidays but in Finland stock exchanges is closed for whole day, e.g. Christmas Eve. In the USA days listed below are announced to be bank holidays (NYSE 2004). In addition to these official dates there have also been some special closings on the period.

January 1st	New Year's Day
January	Marthin Luther King Day
February	Washington's Birthday
April	Good Friday
May	Memorial Day
July 4th	Independence Day
September	Labor Day
November	Thanksgiving Day
December 24th - 26th	Christmas

On the period there are more than one hundred pre-holiday days on the US markets. However, only 64 of these days are pre-holidays in US but normal trading days in Finland because of different trading rules on holidays. Seven days are at the same time pre-holidays on both Finnish and US markets.

All the other days are pre-holidays in the US markets while the market place in Finland is closed. The majority of them is subject to US style to trade some hours on a days presenting holiday in Finland, such as Christmas Eve.

8 Results of the empirical tests

Results presented in this chapter are found by two different analyses; average and regression. Two ways are used because in some cases regression is not fitting in the data and thus significance level falls but something can be said anyway based on the average analysis.

8.1 Holiday effect of a holiday in Finland

8.1.1 Average returns

On average from 1991 to 2003 the Finnish pre-holiday days have presented daily returns of 0,9 % while average normal daily returns on the period has been less than 0,1 %. This significantly high difference is presented in the figure 4 below. The phenomenon reflects the different actions of investors just prior to Finnish public holidays.

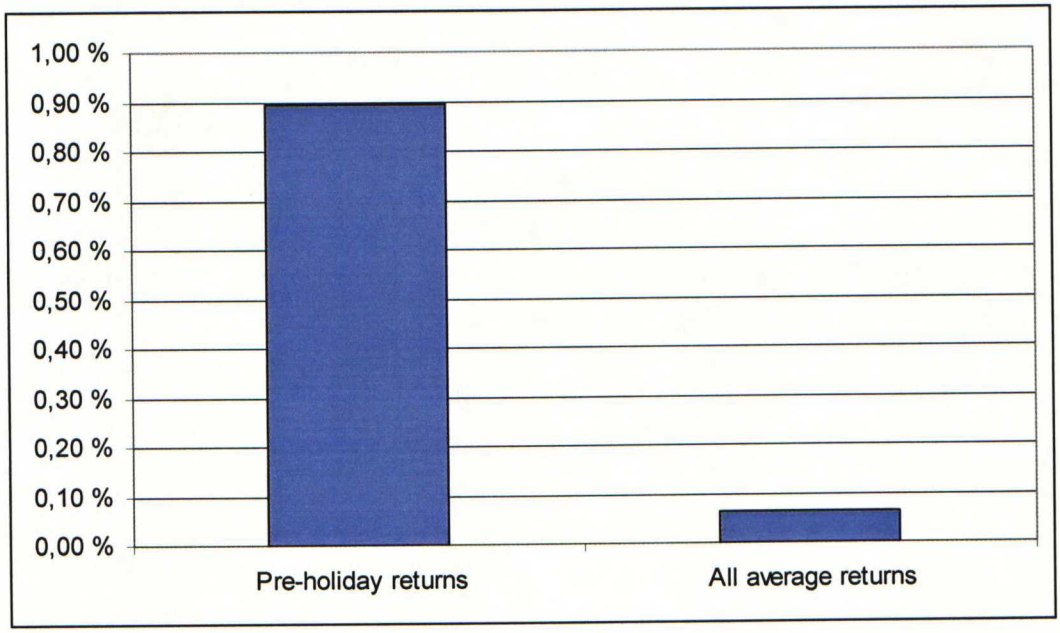

Figure 4 Average Finnish pre-holiday returns compared to all average daily returns

8.1.2 Returns by the regression model

To find the statistical proof supporting this common phenomenon, a regression model is used. The significance level of 95 % is needed, so according to the theory regression's t-test and the F-test values exceeding the critical ones means the dummy variable coefficient or the model is statistically significant. The t-test here is one tailed, because according to the average returns and the hypothesis pre-holiday returns carry positive returns on average. Table 2 below exhibits results of the regression.

Table 3 Results of the regression model for the Finnish pre-holiday effect

Variable	Returns	t-test value	critical t-test values	
Intercept	0,04 %	1,1213	1,96	1,65
Pre-holiday	0,85 %	4,0661	1,96	1,65
F-test value for the model (df = 1)			16,53	
Critical F-test value for the model (df = 1)			3,84	

The Regression model supports the results found comparing average returns in addition to all the similar results previous papers have introduced. The pre-holiday coefficient's t-test value clearly exceeds the critical value and also the F-test value is highly above its limit supporting a very high statistical significance level, close to 100 %. Only the intercept's t-test value does not exceed its critical limit, but this is not very crucial. It merely means that the coefficient does not differ statistically from zero i.e. there is not a trend in it in the long run. In other words daily returns are not riding by some trend on the period. Because the F-test value is excellent the model is valid nevertheless. An Explanation for this low t-value is very probably the high variance of the data.

The very high, 0,85 % return prior to holiday compared to normal daily return, 0,04 % is illustrated in the figure 5 below. More detailed results of the regression are found in the appendix 4.

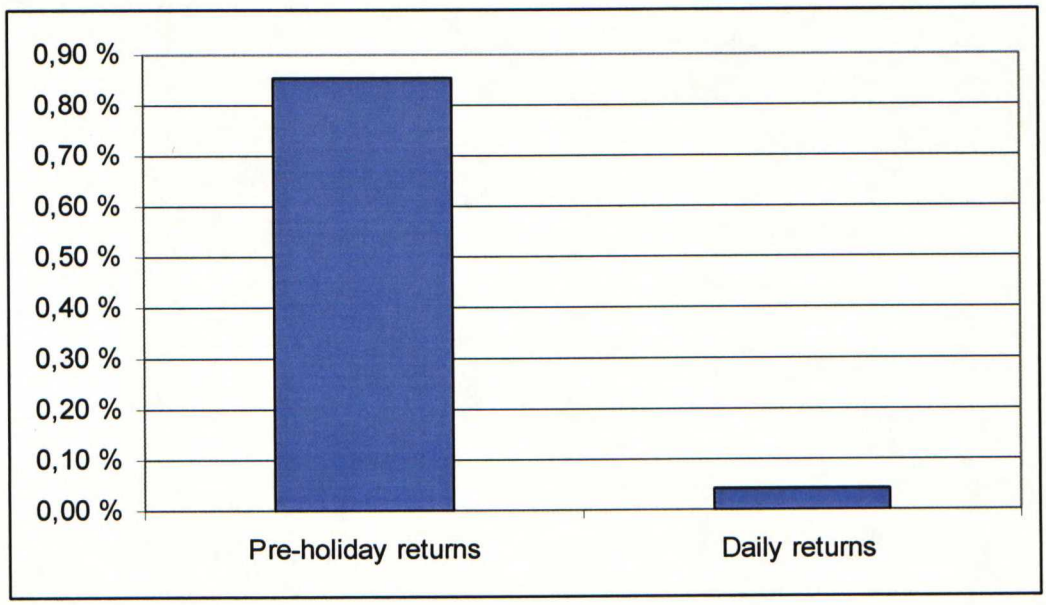

Figure 5 Results of the regression test supporting significance level more than 95 %

The results found are surprising. According to previous studies the returns on pre-holidays can be even 7 times more than normal trading days on other markets, but now it is proven to be 22 times on the Finnish markets. The biggest reason for this may be the positive weekend effect on Friday, but because typical Friday return is 0,25 % (calculated later) and the typical pre-holiday return 0,85 % some other reasons will also affect on this. The other explanations are considered later in this study.

8.2 Holiday effect of a holiday in the USA

8.2.1 Average returns

On average on the sample period the pre-holiday days in the US markets have reflected returns of 0,35 % in the Finnish markets while average daily returns on the period has been less than 0,1 %. The difference is high, as illustrated in the figure 6 below, but not as effective as the effect with the Finnish holidays. However, the average returns analysis makes it clear there is a positive trend before holidays.

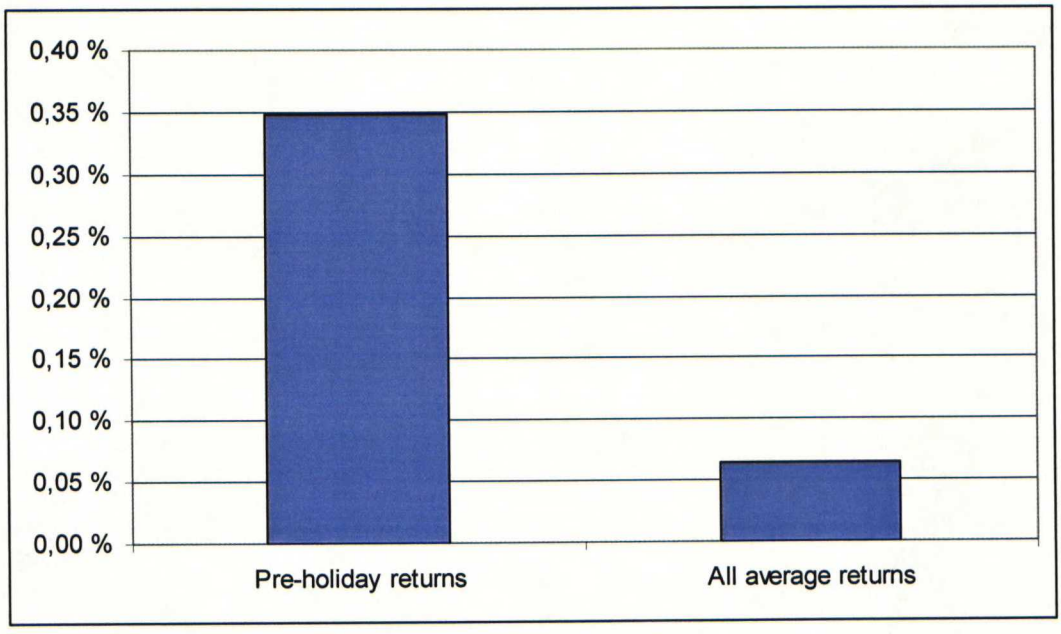

Figure 6 Average US pre-holiday returns compared to all average daily returns

8.2.2 Returns by the regression model

The difference between typical daily return and the returns during a pre-holiday in the US is also considerable. To find the statistical prove regression with 95 % level is carried out and the t-test with the F-test results proves significance.

Table 4 Results of the regression model for the US pre-holiday effect in Finland

Variable	Returns	t-test value	critical t-test values	
Intercept	0,06 %	1,6216	1,96	1,65
Pre-holiday	0,29 %	1,2342	1,96	1,65
F-test value for the model (df = 1)			1,52	
Critical F-test value for the model (df = 1)			3,84	

The regression model does not support the results of the average returns analysis. Because the test values do not exceed their critical ones the phenomenon is not statistically significant. More detailed results of the regression are found in the appendix 5.

It is important to remember, that when the NYSE opens it doors there are only two trading hours left in Finland. Typically prices go up at the end of the trading day, meaning Finnish markets are already closed. Thus, it can be assumed changes in prices are reflected in Finland on the next trading day.

8.3 Holiday effect of an acommon holiday in Finland and in the USA at the same time

Finland and the US have very few holidays in common, although they do share holidays such as Christmas. However, the difference is that in the US markets they keep doors open a few hours on many holidays but Finland on all of the public holidays the stock exchanges is closed. A regression model with three dummies is used to separate these three categories of the holidays.

Table 5 Results of the regression model for the common pre-holidays

Variable	Returns	t-test value	critical t-test values	
Intercept	0,0004	1,0118	1,96	1,645
Finland	0,0079	3,6174	1,96	1,645
USA	0,0017	0,6756	1,96	1,645
Finland+USA	0,0072	0,8822	1,96	1,645
F-test value for the model (df = 1)			6,0953	
Critical F-test value for the model (df = 1)			3,84	

It did not show any trend to compare normal trading days and the special days which are also pre-holidays in both markets. The t-test value is far from its critical one, its value of 0,88 does not prove any significance. More detailed results are presented in the appendix 6. Reason for this low significance is clearly the small amount of common pre-holiday days.

8.4 Combined model for the holiday effect

In the theoretical part of this thesis the combined regression model was also introduced. It is same than used in former studies by Meneu and Pardo (2003) and Cadsby & Ratner (1992). All of them found statistically significant regression model in their markets. Because of this, the same model is now fitted into the Finnish market's data.

8.4.1 Average returns

In the combined model the underlying idea is to notice the other strong anomalies, the January effect and the weekend effect, in calculations. To make sure the results are the most accurate, the pre-holiday returns are investigated after ignoring the possible impact of the other anomalies. As presented in the figure 7 below on average there is high difference between pre-holiday trading days under other anomaly effect also.

On the long run the average daily pre-holiday return is 0,9 % (all returns) and it does not differ remarkably when the pre-holiday day is other than Friday and not in January. The Explanation is simply the power of large numbers. However, there are huge differences on certain other days. If the pre-holiday is on a Friday but not in January returns are more than doubled. But if it is a Friday in January returns are less than on average. Furthermore if it is not a Friday but the pre-holiday day is in January the average return is even slightly negative. So, January seems to cut the power of the pre-holiday effect.

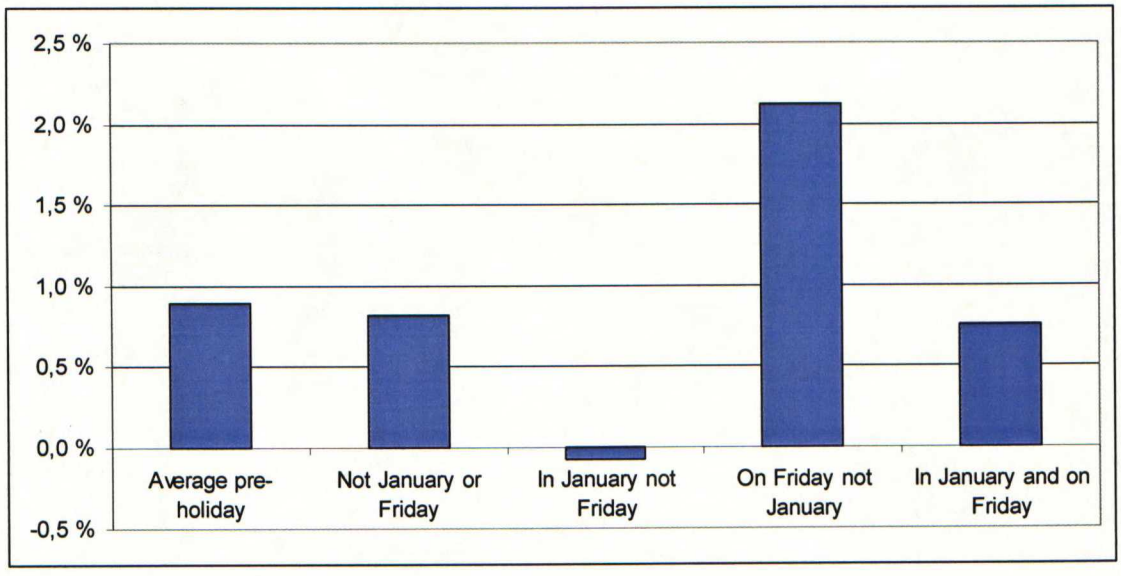

Figure 7 Average returns in different types of pre-holiday days

8.4.2 Returns by the combined regression

After the average analysis we can be sure there are differences and they are strongly into one way so the one tailed t-test is used here also. To ignore the effect of the January anomaly and the weekend anomaly four dummies are needed. One is for a normal pre-holiday trading day, the second one is for a pre-holiday trading day in January but not a Friday, the third one is for a pre-holiday trading day which is a Friday but not in January and the fourth one is for a pre-holiday trading day which is a Friday and in January.

A similar regression model with the same dummy variables is used in the previous studies like presented in the theory.

Table 6 Results of the combined regression model investigating different types of pre-holiday returns. Returns are for pre-holiday days only.

Variable	Returns	t-test value	critical t-test values	
Intercept	0,04 %	1,1217	1,96	1,65
Not January or Friday	0,77 %	3,2825	1,96	1,65
January not Friday	-0,12 %	-0,1477	1,96	1,65
Friday not January	2,08 %	3,3115	1,96	1,65
January and Friday	0,72 %	0,6261	1,96	1,65
F-test value for the model (df = 3)			5,49	
Critical F-test value for the model (df = 3)			2,60	

It can be clearly read from the results on the table 6 that the pre-holiday trading days have very high returns compared to normal trading days when impact of the January effect and the weekend effect are eliminated. The return of 0,77 % is close to 20 times more than the return of the trading days which are not pre-holidays, the t-test confirming that this phenomenon is also statistically significant. The intercept reflect returns of trading days which are not holidays. More detailed results are shown in the appendix 7.

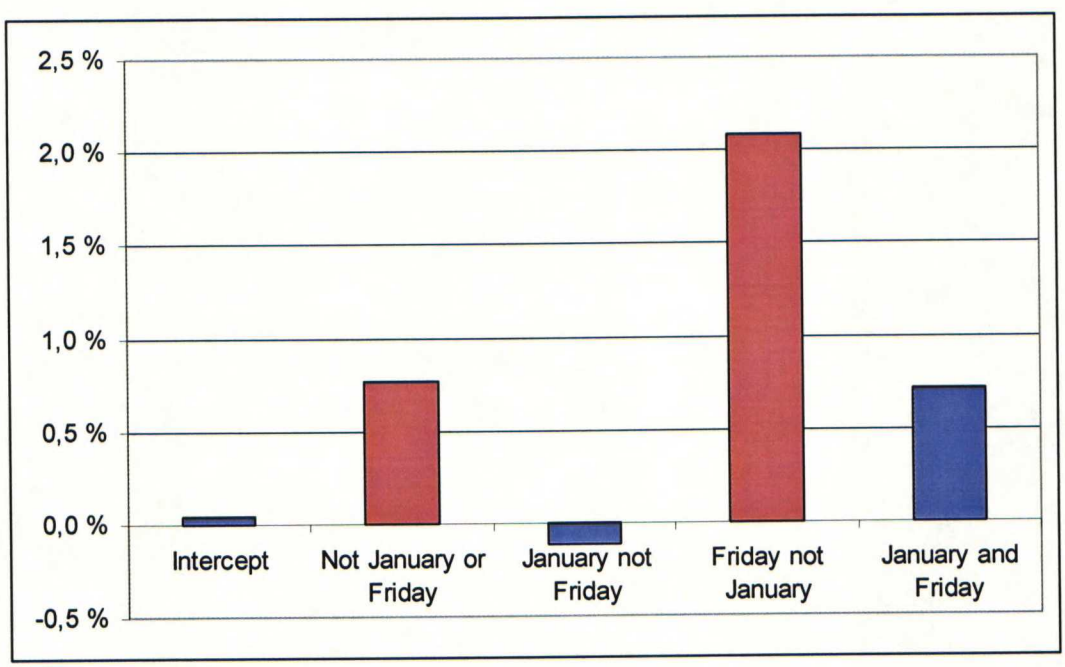

Figure 8 Highest returns occur when the pre-holiday in on a Friday which is not in January

It can be also clearly observed, that Fridays affect on the returns. When the pre-holiday is on a Friday the income is more than 50 times more than typical daily income and this event is even statistically significant. However, if it happens to be January at the same time half of the returns are cut of. This unpredictable change is very probably because of the small sample size. The numbers of the other three dummies are not statistically significant thus nothing certain can be said of them.

It must be remembered, that the three last dummy variables reflect special days, which are uncommon in the period. So, because the sample is small, the results should be read warily.

After all, it is clearly verified that there is positive pre-holiday effect in Helsinki Stock Exchanges, because the same results are found in two regressions, with and without multiple dummies and in addition to the average analysis. Furthermore, it is observed that the Friday effect supports the pre-holiday effect but the January effect weakens the power of it.

8.5 Weekend effect

8.5.1 Average daily returns

Previous studies show that there are high differences in returns during the week. To analyze the weekend effect, average daily returns are calculated first to make sure right dummy variables are chosen to the regression model. The selection of dummies is done to achieve the most accurate models for testing this phenomenon.

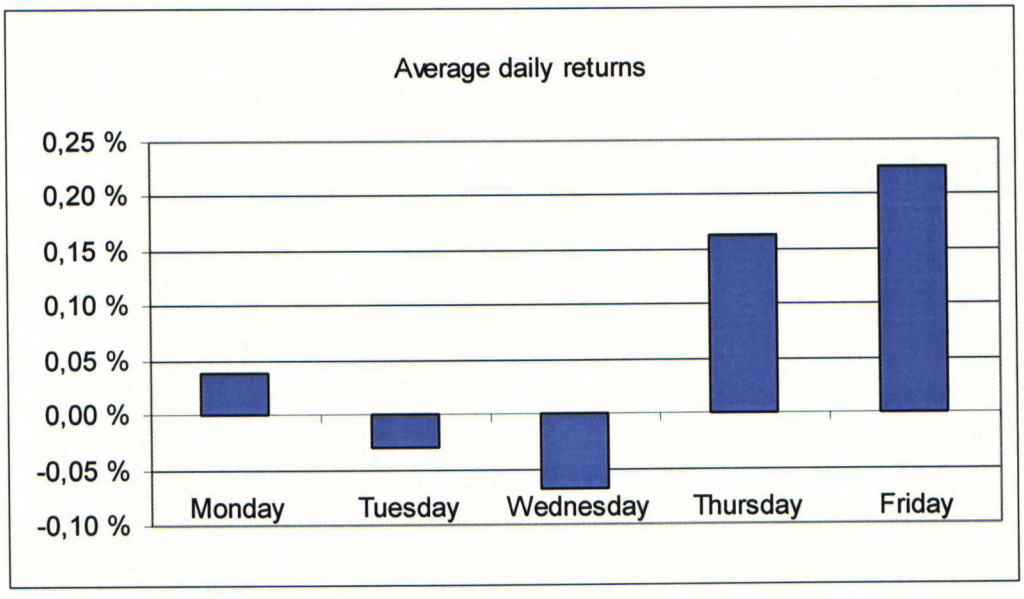

Figure 9 Average daily returns 1991 – 2003

In the figure 9 it can be clearly indicated that the first half of the week presents returns negative or close to zero and the second half of the week positive returns. Hence, later in the regression models dummy variables are chosen based on this conclusion. The Week is therefore split into two parts. The first half includes Monday, Tuesday and Wednesday and the second half Thursday and Friday.

8.5.2 Weekend effect on the first half of the week

The first half of the week includes all low-return days, Monday, Tuesday and Wednesday. On an average Monday return is positive but almost zero and the other days present negative returns. However, in the regression model Monday returns turn to have a negative coefficient.

Table 7 Results of the regression model for the first half of the week

Variable	Returns	t-test value	critical t-test values	
Intercept	0,19 %	3,4897	1,96	1,65
Monday	-0,16 %	-1,6312	1,96	1,65
Tuesday	-0,23 %	-2,3680	1,96	1,65
Wednesday	-0,26 %	-2,7479	1,96	1,65
F-test value for the model (df = 3)			3,33	
Critical F-test value for the model (df = 3)			2,60	

In table 7 it is clearly indicated that the three first days of the week present downswing in returns. According to the theory, the t-test and the F-test values exceeding the critical ones (or falling below in negative side) mean the dummy variable coefficient or the model is statistically significant in 95 % level. There are two critical t-test values presented, because the test can be done as one-tailed or two-tailed. One-tailed is used if assumed in hypotheses that the value of the coefficient will be even positive or negative. Two-tailed test otherwise. In the results of the theses both are concerned because of uncertainty of which day has positive and which day has negative return(s).

The results of the first half of the week regression are indisputable. All coefficients pass t-test despite Monday one. However, its value is very close to the critical value and will pass the test in 90 % level. F-test value exceeding its critical value it means all the coefficients together make regression that is statistically significant in 95 % level. More detailed results are presented in the appendix 1.

So, it can be said that the weekend effect in Helsinki Stock Exchanges is observed as negative returns on Tuesdays and Wednesdays. The Weight of the effect is on Wednesdays. There is also negative Monday effect that is not as strong as the others however.

8.5.3 Weekend effect on the second half of the week

The second half of the week includes days presenting positive returns, Thursday and Friday. On average these days present clearly high returns when the other days of the week slightly negative returns.

Table 8 Results of the regression model for the second half of the week

Variable	Returns	t-test value	critical t-test values	
Intercept	-0,02 %	-0,4559	1,96	1,65
Thursday	0,18 %	2,0368	1,96	1,65
Friday	0,25 %	2,7075	1,96	1,65
F-test value for the model (df = 1)			4,67	
Critical F-test value for the model (df = 1)			3,84	

In table 8, it can be read that assumptions by average returns were right and the second half of the week presents high positive returns. In this model both t-test and F-test values exceed clearly meaning the model is significant in 95 % level. The intercept coefficient does not exceed the t-test value, but it only means the coefficient does not differ statistically from zero. However, the more interesting ones are Thursday and Friday dummies. More detailed results are presented in the appendix 2.

So, it can be said that the weekend effect in the Helsinki Stock Exchanges is observed as high positive returns on Thursdays and Fridays. Friday is the strongest one of these.

8.5.4 Summary of the weekend effect

Based on the average daily returns week is split in two halves. The first half, consisting of Monday, Tuesday and Wednesday, reflects negative weekend effect. The second half, Thursday and Friday, reflects positive weekend effect.

The results are similar than found in former studies. However, usually negative returns occur on Mondays in the US markets and on Tuesdays in European markets. Positive Thursdays and Fridays are also found in other countries, but not as strongly as here. The reasons for these are discussed later in this study, as will the profit opportunities.

8.6 January effect

8.6.1 Average returns

On the sample period from 1991 to 2003 the average monthly return has been 1,4 % and average January return has been 2,4 %, as illustrated in figure 10 below. Returns are calculated merely by comparing the index value at the end of the months, so there is the possibility of data mining bias, but in the long run difference is clearly indicated. The same method is used in former studies and since will be used here also. Results reflect the incontestable difference of Januaries higher returns.

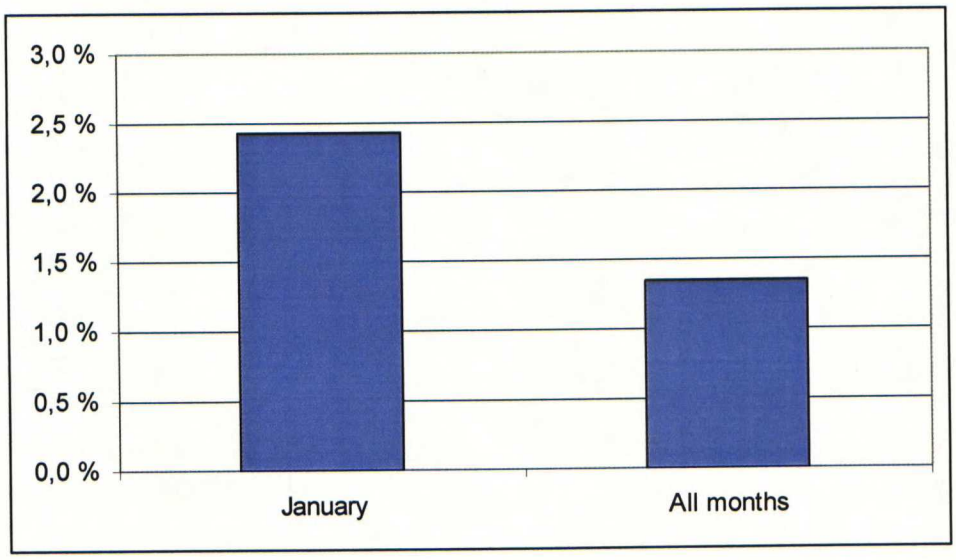

Figure 10 Average January returns compared to average returns of other months

8.6.2 Returns by the regression model

To test the statistical significance level of the January effect the regression model is used again and results tested by the t-test and the F-test. The difference here is that the t-test is now one-tailed because the January returns are assumed to be positive according to the hypotheses and supported by the average returns calculations.

Table 9 Results of the regression model for the January effect

Variable	Returns	t-test value	critical t-test values	
Intercept	1,25 %	1,5832	1,96	1,65
January	1,18 %	0,4339	1,96	1,65
F-test value for the model (df = 1)			0,19	
Critical F-test value for the model (df = 1)			3,84	

By regression model the January dummy does not present higher returns, as illustrated in the table 9 above. This is a complicated situation, because average returns are clearly higher in Januaries. The explanation is simply that the regression model does not fit to test this effect on this period. As indicated in table 9, the t-test or the F-test values are not even close to the critical ones, so using the regression model does not make any sense here. Results just mathematically mean that the coefficients do not statistically differ from zero. More detailed results are presented in appendix 3.

The reasons to fail with the regression for the January effect are too short time period and too "noisy" data. In the period there are only 13 Januaries, which is not enough to provide mathematically results accurate enough. In addition there has been recession and upswing in the time period causing high variance to the data.

Thus, according to the average returns there is January effect but because the regression test failed, nothing about the statistical significance level can be said.

9 Discussion

9.1 Changes to profit by the holiday effect

The law of strong market says there are no possibilities to profit by the anomalies i.e. there are not arbitrage opportunities on the effective markets. Because the very effective holiday phenomenon was found from Finnish markets, it is interesting to go deeper in the investigation and check whether it is possible to make profit by this information. Some previous studies have already shown profit opportunities in other markets, for example Pardo and Lucay (2003).

Regression models show that the holiday effect is making a trend in Finnish markets which usually means profit opportunities. However, there is always a risk when investing by just basing the investment on a trend. Because of this, profit opportunities must be adjusted for risk before they can be compared meaningfully.

9.1.1 Method

There are several different methods how to take the risk into calculations. Bodie et al. (1999) presented some different risk-adjusted performance measures. The best-known, Sharpe's measure, divides average portfolio excess return over the sample period by the standard deviation of returns over the period. It measures the reward to volatility trade-off. It presents so-called risk-adjusted return.

$$S = \frac{(r_p - r_f)}{\sigma_p} \tag{9.1}$$

r_p = *portfolio return*

r_f = *risk – free return*

σ_p = *portfolio volatility*

To define the Sharpe measures volatilities of the portfolio returns are needed. The portfolio returns are now daily returns and different portfolios are trading days of different anomalies e.g. average of pre-holiday days returns is one portfolio return.

9.1.2 Investing on pre-holidays

The possibility to exploit the holiday phenomenon is evaluated with Sharpe measures. Table 10 below presents volatilities and Sharpe measures, using them while assuming the risk-free rate (daily return) is very close to zero.

Table 10 Sharpe measures for normal and pre-holiday returns

Portfolio	Volatilities	Sharpe measures
Normal trading day	0,0198	0,0200
Pre-holiday day	0,0207	0,4314
Risk-free rate	0,00 %	

Even though pre-holiday days have higher volatility, the difference is so small that the pre-holiday days keep clearly higher Sharpe measure values. This means it makes sense to buy at the end of the day of two days before holiday and sell at the end of the day just prior to holiday.

Results are similar to those which Listola (2004) reported: the holiday effect in the event window starts on one day before holiday and continues one day after the holiday presenting higher returns. After that returns are going down. This holiday effect and correction effect of it are illustrated in the figure 11.

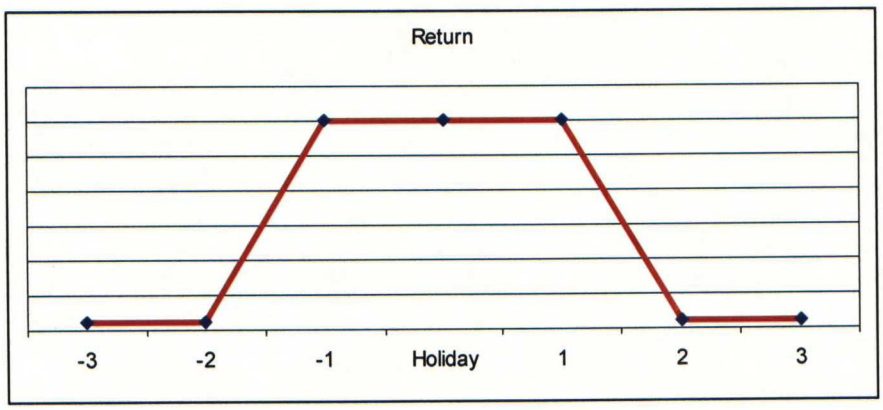

Figure 11 Returns before and after the holiday according to Listola (2004)

However, the opportunity to make profit is theoretical and in practice the situation is not as simple. The return is only at a peak for one day, presenting a return of less than 1 %. Typically transaction costs are 0,10 % – 0,25 % + around 5 € (Sampo Bank 2004) meaning a fairly large amount of money should be invested to turn the short investment profitable enough. For institutional investors this provides a better chance to make profit than for individual investors, because of the lower transaction costs and bigger amount of money to invest they have. The best practical tip is therefore that if you are going to sell, do it at the end of the day just prior to a holiday and if you are going to buy, do it on a day a few days before a holiday.

Even though it is not possible to make incredible returns in a few days just by the holiday phenomenon, in the long run a strategy based on this information can make sense, thus it is interesting to test this.

How to build the strategy and do the investment in practice, then? The results reported are based on the general (HEX All-Share) index, so investment should be also to the general index so returns in practice could be alike. Of course, in practice this is impossible, because it supposes investing in all shares in the Helsinki Stock Exchanges. In practice the investment must then be done virtually through an index fund (where weights are alike with the general index) or more directly investing in some index warrant. In the previous studies (e.g. Pardo and Meneu, 2003) investing in the five most

traded stocks by exploiting the holiday effect yielded also positively but in this study some placing acting more likely to the general index will be searched for .

The best solution for the placement could then be the HEX25 Index Share Fund which provides a possibility to invest in fund acting most like the general index. The next chapter reports returns achieved when utilizing the holiday phenomenon in this fund.

9.2 Investing in fund by the holiday phenomenon

To build up an investment closest to the information this study generated from the returns of the HEX All-Share Index, the HEX25 Index Share Fund is chosen. In the Finnish markets it behaves most alike with the All-Share Index, which is the base for the returns investigated in this study.

9.2.1 What is the HEX25 Index Share Fund?

The HEX25 Index Share Fund is an exchange-traded fund. The fund's shares can be bought and sold on the Helsinki Stock Exchange like normal equities. With the HEX25 Index Share Fund you can get the 25 most liquid shares in the Finnish market with just one trade. (HEX25, 2004)

The management fee of the HEX25 Index Share Fund varies from 0,17 % to 0,25 % p.a., depending on the size of the fund. It is clearly the most cost-efficient way to invest in the largest companies in Finland. (HEX25, 2004)

The HEX25 Index Share Fund is based on the HEX25 index. The HEX25 index is a capitalization weighted share price index. It is calculated from the most recent prices of the 25 most traded stock classes that are listed on the main list of the Helsinki Stock Exchanges. Options and futures on HEX25 Index are traded on Eurex. (HEX c, 2004)

In practice, the stock's weights in the HEX25 Index Share Fund are the same than weights in the HEX25 index. The maximum weight of one stock in the fund is limited to 10 %, as it is also limited in the index.

9.2.2 Returns achieved by investing in the HEX25 Index Share Fund

Previous chapters have shown that there are a few different ways to profit by the holiday effect. The first one is to buy in the morning on the pre-holiday day and sell at the end of the day. However, Listola (2004) presented a theory that the buying should be done two days prior to the holiday and this will return the same profit when selling one day after the holiday.

In this study the results Listola (2004) presented, in addition to many different results abroad, were tested. The best return for the period from 1991 to 2003 was achieved when stocks were bought two days before the holiday in the morning and were sold two days after the holiday just before closing time.

The fictional investment simulates a trading strategy which is feasible for an individual investor: investing 10000 € at the beginning and trading only around holidays but on every holiday. Transaction costs are assumed to be on the typical level for an individual investor, to buy or to sell cost is 0,10 % of the value per trade (in addition a investment with 0 % trading cost is benchmarked). Because in this trading strategy the investor both buys and sells at the holiday time, transaction costs are also charged two times. Table 11 below presents how this active trading strategy makes profit and how profitable it will be without transaction costs. The return is compared with a simple buy and hold strategy where stocks are bought in 1991 and held until 2003.

Table 11 Returns by active trading only around holidays compared with return of the buy and hold strategy.

Strategy	Active trade	Active trade	Buy and hold
Portfolio value at the beginning	10 000 €	10 000 €	10 000 €
Transaction costs per trade	0,10 %	0,00 %	
Portfolio value at the end	48 589 €	58 218 €	31 511 €
Average annual return	14,08 %	15,81 %	10,04 %

The simulation proves that the investing strategy based on the holiday effect yields better profits than the buy-and-hold strategy. During the long period, average annual return has been 14 % for the trading strategy but only 10 % for the buy-and-hold strategy.

The difference between these two trading strategies is that when an investor buys and sells the stock around holidays the portfolio does not reflect the development of the Stock Exchanges during the long period, just on the few days the investor owns the asset. In the buy-and-hold strategy the portfolio value all the time reflects the development of the Stock Exchanges. In figure 12, the development of the portfolio values is illustrated in both strategies (active trading strategy with and without trading costs).

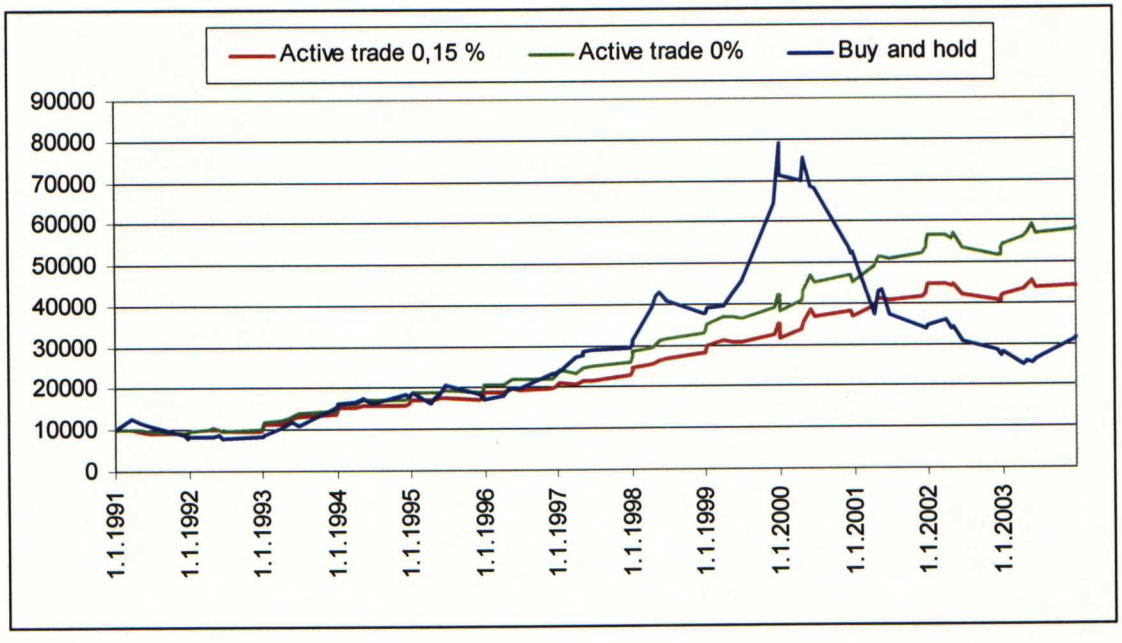

Figure 12 In the buy and hold strategy portfolio's value reflect changes on the market on the long period, but in the holiday trading strategy the portfolio's value is independent of long periods development. The buy and hold return is compared with returns of active trading strategy with and without transaction costs.

The differences in the portfolio value development mean also differences in volatilities. The holiday trading strategy has lower volatility and return is more stable. The buy and

hold strategy has higher volatility because there have been high changes on the markets as discussed earlier whereas the boom and recession do not affect the holiday trading strategy.

So, it can be concluded that investing by the holiday phenomenon makes sense on markets conditions such as in this period, because it has lower risk with higher return. But, if there is a high and stable upswing in the markets, the buy and hold strategy could be better. In this study the investigation period has been stormy and mainly because of the IT boom around year 2000, the buy and hold strategy has been inappropriate.

9.3 Anomalies reported compared with previous studies

Anomalies were first presented in literature years ago. The most commonly known anomalies, the January effect and the weekend effect were introduced for first time even decades ago, but the focus of this thesis, the holiday effect, was only introduced in 1987.

Anomalies indicate either market inefficiency or inadequacies in the underlying asset-pricing model. After they are documented and analyzed in academic literature, anomalies often seem to disappear, reverse or attenuate. It implies that as research findings increase market becomes more efficient as rational traders take advantages of anomalous behavior. In contrast, if they still exist both statistically and economically, there must be other factors that are effective. If anomalous return behavior is not definitive enough for an efficient trader to make profits in trading on it, then it is not economically significant. This definition of market efficiency directly reflects the practical relevance of academic research into return behavior. It also highlights the importance of transaction costs and other market microstructure issues for defining market efficiency.

Within this framework, the purpose of this paper was to detect whether calendar anomalies, especially the holiday anomaly, are still evident in the Finnish markets even though these anomalies have been documented a long time ago.

9.3.1 Holiday effect

In this thesis the holiday effect is found presenting very high returns on the days prior to holidays. In the present studies abroad the pre-holiday effect is also found as higher returns before holidays, typically presenting around ten times more than normal returns (e.g. Pardo and Meneu, 2003). In the Finnish markets, Listola (2004) reported significant pre-holiday effect with two event windows, one day and five days. The mean returns on these windows were 32 and 45 times the normal rate of return. In addition abnormal high returns were statistically significant for both the All Share and Portfolio index.

In this thesis returns found almost doubled the previous results made abroad. Returns found in the Helsinki Stock Exchanges prior to holidays are more than 20 times more than returns on normal trading days. Results are then in line with the ones Listola (2002) presented, even though methods were not completely similar.

Listola (2004) also investigated the effect of US holidays, but did not report statistical significance for the correlation between Finnish markets and US holidays. The correlation was neither found in this thesis.

There is a correlation between the weekend effect and the holiday effect. Though the evidence is not the strongest possible, it is documented that positive returns on Fridays boost the holiday effect. Statistical significance is also found on the effect. This differs with Listola's work, (2004) which reported that the holiday effect was not a manifestation of other calendar anomalies.

Nonetheless, it can be concluded that the holiday effect is still alive. All of the studies have found it prevailing statistically significant, and some even economically significant. The most interesting question is why the effect is so effective in Finland.

Reasons for the pre-holiday effect and its strength just in the Finnish markets are not easy to define. One explanation for it is the positive Friday effect, because many times

pre-holiday days are just Fridays. However, Friday return explains half of the pre-holiday return, so there has to be something else.

9.3.2 Weekend effect

The weekend effect is the first one of the two most commonly known anomalies. In the previous studies (e.g. Foster and Viswanathan, 1990) weekend effect has occurred as negative Mondays and Tuesdays. Usually negative Mondays are found in the US markets and negative Tuesdays in the European and Asian markets. The explanation has been that Asian markets follow dominating US markets and because of time difference the decline is postponed by one day.

The weekend effect was investigated the last time in Finnish markets by Wikström (2002). The paper expressed statistically significant negative returns on Wednesdays and positive returns on Fridays. In the 1996 Martikainen and Puttonen found also the negative effect on Wednesday, but also on Tuesday.

In this thesis the weekend effect was found statistically significant as negative returns on Tuesdays and Wednesdays but not on Mondays. The results are then in line with the previous studies of Finnish returns but differ from results from other markets abroad.

Several studies have typically just marked negative Mondays. On the US markets negative Monday returns have many explanations as discussed at the beginning of this thesis. Negative Tuesdays on many European markets are explained by the dominating role of the US markets reflecting the effect in Europe after one day because of the different time zones where markets are situated.

Negative Wednesdays are not found in other markets in previous studies. One explanation why the weekend effect is observed on Wednesday in Finland could be a chain reaction. On the US markets Monday effect is observed as negative Tuesdays in big European markets, like UK markets. Because markets in the UK for example are closed a

few hours after markets in Finland, closing prices are then reflected to Finland on Wednesdays.

9.3.3 January effect

The January effect is the second one of the two most commonly known anomalies. Typically it is found on the markets as higher returns on Januaries (e.g. Haugen and Jorion, 1996). A very large number of studies have investigated the January effect and almost all of them have found it having relevant impact on returns. Generally the effect is explained by investors' smart tax policy.

Recently Wikström (2002) found also the positive January effect on Helsinki Exchanges. However, the phenomenon was found only on a long period, lasting from 1970 to 2001. When tested with a shorter period, the effect disappeared.

In this study the January effect is also found as average higher returns on Januaries. However, the regression model did not proof its statistical significance. There are two reasons why the regression model did not verify the phenomenon. The most important is the limited number of data. There are only 14 Januaries on the period, so high variance on January returns will decrease the significance level. This explanation supports also the results Wikström (2002) reported by the shorter period regression.

Another reason why significance was not found, is the strong cyclic fluctuation of the economy on the period. Massive boom and recession on the short period will affect on the variance, which will boost the misfit of the regression.

On the previous studies on other markets sample period has typically been longer (e.g. Haugen and Jorion, 1996), so fluctuations have not been as harmful for testing. The typical investigation period in the latest studies has been began the 1970's.

9.4 Answers for the research questions

Answers for the research questions at the beginning of this thesis were found. The answer for the first question is that there is a statistically significant holiday effect in the Helsinki Stock Exchanges.

The Answer for the second question is that there is significant weekend effect, reflecting negative returns on Tuesdays and Wednesdays and continuing with positive returns on Thursdays and Fridays. January returns also differ from normal daily returns. However, statistical significance was not found for this phenomenon.

The third question was about the correlation of different anomalies over the same sample period. The answer is that anomalies interact with each other and on this period it is seen with the holiday effect and the weekend effect. Weekend effect on Friday boosts the holiday effect significantly.

The fourth question was about differences in results found in Finland than in other markets. This thesis reports results are alike, but the holiday effect is stronger in Finland and the weekend effect is found the most important on Wednesdays while it has been claimed to occur on Mondays in other studies.

The fifth and the most interesting question was whether it is possible to profit by the anomalies. The fictional portfolio yielded on the period better than markets on average, so it really is possible to make noteworthy profit by the holiday phenomenon.

9.5 Criticising results

Typically academics' priority is obtaining a high degree of statistical confidence without necessarily taking into account whether results are up-to-date. But, investors need to be alerted to changing trends. So, for investors to rely on the academic approach to testing for anomalies, they should consider the persistence of the effect and its changing nature.

A very large number of papers in finance follow the same approach when investigating anomalies by the dummy variable regression model. Thus it is also used to verify the results of this thesis. To test the existence of any anomaly the null hypothesis would be the difference between the "anomaly"-return and average return for the remaining days.

Nevertheless, the tests present severe statistical flaws. Some studies have indicated that statisticians and econometricians who work with large data sets know that F-test has a tendency to reject the null hypothesis too often, unless the significance level is adjusted downwards as the sample size increases. This means that all the results of this study must be interpreted carefully, and the models, which are rejected by the F-test, are not even close to a significant one.

It is also discussed that departures from non-normality, serial correlation and heteroscedasticity assumptions can lead to misleading inferences in the models used to test market anomalies.

Furthermore, some surveys argue that dummy regression model may wind up unwarranted results as it fails to take into account the return variances for testing the underlying hypotheses. It is shown, that estimates of the dummy variables in regression models tend to reject the null hypothesis incorrectly once the stock returns exhibit higher volatility for the specified event under examination.

Although different methods have been suggested in order to avoid the aforementioned problems, the dummy variable regression keeps being extensively employed in the market seasonality literature.

The problems listed above were recognized before this thesis, but the regression model was used nevertheless. Although the model has been criticized, it is valid enough for the purpose of this thesis. Since the last purpose was to compare results found by this thesis and previous studies, same methods must be used.

Furthermore, the sample data period on this thesis did not present the best one. The recession and the boom on the same period caused very high variance, which is not favourable for a systematic investor. Better data could be obtained by collecting the daily returns before the high IT-boom at the end of the period, but rejecting it would cause results far from up-to-date. The conflicted situation could be solved by some other testing methods than regressions, some which take variance into account. In addition, the data includes only daily values and erosion in practical actions e.g. bid-ask spread is not noticed.

After all, if anomalous return behaviour is not large enough for an efficient trader to make money trading on it, then it is not economically significant. It is just statistically significant and leads nowhere for an everyday trader. In this study the holiday effect found for one day was economically significant for institutional investors. There is a clear profit opportunity, but the problem is that these pre-holiday days exist very seldomly. In the long run exploiting the phenomenon by investing in the HEX25 Index Share Fund was profitable for individual investors but on a different period with different market conditions this may not hold true.

10 Summary

This study examined whether the holidays in Finland and in the USA effect on returns in the Helsinki Stock Exchanges' main list and whether it is possible to profit by the effect holidays may cause. The power of holidays on stock returns is called as a holiday effect anomaly. The survey on other commonly known anomalies, the weekend effect and the January effect, supported the analysis on how anomalies interact with each others.

The motivation for the topic were previous studies from other markets reporting significant holiday effect just prior to holidays. In addition only one former study has inspected the phenomenon in Finnish markets. Earlier studies have also reported theoretical chances for an individual investor to profit by the holiday effect, but have not advised on how to do it in practice then and how much it can be yielded in practice. This was one of the most interesting questions of this study.

The investigation period was chosen to begin in 1991 when the HEX All-Share Index was taken into use to and decided to last until 2003. The data was recorded from the main list of the Helsinki Stock Exchanges. Empirical methods were collected from previous studies to make it possible to compare results.

The thesis consisted of four parts. The first part introduced the most important anomalies, the weekend effect, the January effect and the holiday effect as well as some other less known anomalies. The literature review introduced methods and results of former studies. Several studies of seasonalities in literature and journals put together the clear impact of anomalies on stock exchanges around the world.

The second part introduced the data and market's development on the Helsinki Stock Exchanges during the sample period as well as methods how to analyze the data. Regression models used in the past studies were all quite similar, and therefore used in this thesis also to provide easy comparison of results. For the holiday effect different

regression models were persuaded. In addition to the regressions, statistical tests to verify the significance of the results were presented.

The third part was empirical. The daily returns from Finnish markets during the past 14 years were analyzed by different regression models. The weekend effect and the January effect were analyzed slightly, but the holiday effect on a more advanced way. The power of the US holidays was also taken into the calculations.

The fourth part reports significant holiday effect in Finnish markets. Returns just prior to holidays were many times more than average returns of normal trading days. The abnormal returns were also statistically significance, so the existence of the holiday effect in Finnish markets is incontestable. The Regression models show statistically significant effect, which raises returns more than 20 times compared to normal daily return. Average return analysis supported the regression results; normal daily return 0,04 % against pre-holiday return 0,85 % leaves no room for questions.

In the deeper analysis the effect of other anomalies on the holiday effect were excluded by using a combined regression model. Results did not change notably implying the abnormal return being a subject of holidays only. The only important note is that when the pre-holiday day happens to be on Friday, returns are even double than those of other pre-holiday days.

The US holidays clearly raise returns in the Finnish markets. However, statistically the effect was not proven to be significant. The Reason is mainly the different rules of stock exchanges.

In addition to the holiday phenomenon, the weekend effect presented statistically significant negative returns on Tuesdays and Wednesdays and continued with positive returns on Thursdays and Fridays. The effect of negative Monday was not found even though it has been dominating many previous studies.

The January effect is prevailing when comparing average returns, but statistical proof was not found. The main reason for this weak significance was clearly the limited sample data period.

After the empirical part, short comparison with previous studies was made and some criticism for the results was also found. Results reported are in line with previous studies and support the conclusions Listola (2004) presented in the study investigating holiday effect in Finnish markets.

Moreover, a chance to profit by the anomalies was discussed, because it was shown that the pre-holiday return could compensate market frictions. The problem in profit opportunities is how to exploit the phenomenon in practice. One solution was to invest in an index fund, which reflects the market returns most alike. In the Finnish market the best way to do this is to invest in the HEX25 Index Share Fund. The fund includes 25 the most traded stocks from the main list and since the value of it reflects the changes in the HEX All-Share index quite well.

Some different fictional trading strategies were tested, but surprisingly the best strategy was to buy stocks two days before the holiday and sell them two days after the holiday, hold until the next holiday and trade again. This strategy yielded more than 14 % p.a. while the buy-and-hold strategy yielded only 10 % p.a. The risk in the active trading strategy was also smaller than with the buy-and-hold strategy when measured by the volatility. The holiday effect was therefore proved to serve clear profit opportunity for investors.

Motivation for further studies is the chance for an individual investor to profit by the holiday effect in practice. It is attractive and it will be interesting to travel deeper into the world of anomalies and compare different practical trading strategies based on the holiday phenomenon and other anomalies.

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Appendix 1.

Results of the regression for weekend effect on the first half of the week

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,0554
R Square	0,0031
Adjusted R Square	0,0021
Standard Error	0,0199
Observations	3251

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0,0040	0,0013	3,3314	0,0187
Residual	3247	1,2839	0,0004		
Total	3250	1,2878			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,0019	0,0006	3,4897	0,0005	0,0009	0,0030	0,0009	0,0030
Monday	-0,0016	0,0010	-1,6312	0,1029	-0,0034	0,0003	-0,0034	0,0003
Tuesday	-0,0023	0,0010	-2,3680	0,0179	-0,0041	-0,0004	-0,0041	-0,0004
Wednesday	-0,0026	0,0010	-2,7479	0,0060	-0,0045	-0,0008	-0,0045	-0,0008

Appendix 2.

Results of the regression for weekend effect on the second half of the week

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,0536
R Square	0,0029
Adjusted R Square	0,0023
Standard Error	0,0199
Observations	3251

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0,0037	0,0018	4,6732	0,0094
Residual	3248	1,2841	0,0004		
Total	3250	1,2878			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	-0,0002	0,0004	-0,4559	0,6485	-0,0011	0,0007	-0,0011	0,0007
Thursday	0,0018	0,0009	2,0368	0,0418	0,0001	0,0036	0,0001	0,0036
Friday	0,0025	0,0009	2,7075	0,0068	0,0007	0,0042	0,0007	0,0042

Appendix 3.

Results of the regression for January effect.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,0351
R Square	0,0012
Adjusted R Square	-0,0053
Standard Error	0,0942
Observations	155

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0,0017	0,0017	0,1883	0,6650
Residual	153	1,3570	0,0089		
Total	154	1,3586			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,0125	0,0079	1,5832	0,1155	-0,0031	0,0281	-0,0031	0,0281
January	0,0118	0,0273	0,4339	0,6650	-0,0421	0,0658	-0,0421	0,0658

Appendix 4.

Results of the regression for holiday effect when it is a holiday in Finland.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,0712
R Square	0,0051
Adjusted R Square	0,0048
Standard Error	0,0199
Observations	3251

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0,0065	0,0065	16,5332	0,0000
Residual	3249	1,2813	0,0004		
Total	3250	1,2878			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,0004	0,0004	1,1213	0,2622	-0,0003	0,0011	-0,0003	0,0011
Pre-holiday days	0,0085	0,0021	4,0661	0,0000	0,0044	0,0127	0,0044	0,0127

Appendix 5.

Results of the regression for holiday effect when it is a holiday in the USA.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,0216
R Square	0,0005
Adjusted R Square	0,0002
Standard Error	0,0199
Observations	3251

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0,0006	0,0006	1,5233	0,2172
Residual	3249	1,2872	0,0004		
Total	3250	1,2878			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,0006	0,0004	1,6216	0,1050	-0,0001	0,0013	-0,0001	0,0013
Pre-holiday days	0,0029	0,0024	1,2342	0,2172	-0,0017	0,0075	-0,0017	0,0075

Appendix 6.

Results of the regression for holiday effect when it is a holiday in at the same time in Finland and in the USA.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,0748
R Square	0,0056
Adjusted R Square	0,0047
Standard Error	0,0199
Observations	3251

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0,0072	0,0024	6,0953	0,0004
Residual	3247	1,2806	0,0004		
Total	3250	1,2878			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,0004	0,0004	1,0118	0,3117	-0,0003	0,0011	-0,0003	0,0011
Finland	0,0079	0,0022	3,6174	0,0003	0,0036	0,0122	0,0036	0,0122
USA	0,0017	0,0025	0,6756	0,4993	-0,0032	0,0065	-0,0032	0,0065
Finland+USA	0,0072	0,0082	0,8822	0,3778	-0,0088	0,0233	-0,0088	0,0233

Appendix 7.

Results of the combined regression model.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,0820
R Square	0,0067
Adjusted R Square	0,0055
Standard Error	0,0199
Observations	3251

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	0,0087	0,0022	5,4892	0,0002
Residual	3246	1,2792	0,0004		
Total	3250	1,2878			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,0004	0,0004	1,1217	0,2621	-0,0003	0,0011	-0,0003	0,0011
Not January or Friday	0,0077	0,0024	3,2825	0,0010	0,0031	0,0123	0,0031	0,0123
January not Friday	-0,0012	0,0081	-0,1477	0,8826	-0,0171	0,0147	-0,0171	0,0147
Friday not January	0,0208	0,0063	3,3115	0,0009	0,0085	0,0331	0,0085	0,0331
January and Friday	0,0072	0,0115	0,6261	0,5313	-0,0153	0,0297	-0,0153	0,0297